



NORTHERN REGION OF NIGERIA

**Annual Report of the Ministry
of Agriculture of the Northern
Region of Nigeria
1957-58**

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**Annual Report of the Ministry of Agriculture
Northern Region of Nigeria, 1957-1958**



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FOREWORD

BY

THE HONOURABLE ALHAJI MOHAMMED MUSTAFA, M.H.A.,
MINISTER OF AGRICULTURE, NORTHERN REGION
OF NIGERIA

The rains in 1957 were excellent. The planting rains were early and regular rainfall throughout the season produced splendid crops. The tonnages of groundnuts and cotton purchased were nearly double those for 1956 and food crops were well above average.

The year also saw the division of the Ministry of Natural Resources into two separate Ministries, the Ministry of Agriculture and the Ministry of Animal Health and Forestry and the splitting up of the old Department of Agriculture into Divisions integrated within the Ministry of Agriculture.

The position of the Senior Staff has continued the improvement shown in 1956-57, but I regret that there is still a shortage of trained junior staff, both technical and clerical, in all Divisions. A new Division, the Agricultural Training and Education Division, was established during the year to tackle this problem.

On the whole it has been a year of achievement and progress and with the gift of a good harvest the farmers throughout the Region have been contented and prosperous. I am grateful to the officers and staff of this Ministry who toiled and played their part in making this prosperity possible.

October, 1959.

Part I—Field Services Division

GENERAL

1. The most noteworthy event has been the reorganisation of the Ministry. The Ministry of Natural Resources was divided into the Ministry of Agriculture and the Ministry of Animal Health and Forestry, and the Department of Agriculture was split into six Divisions integrated into the Ministry of Agriculture.

2. The organisation within the Provinces has continued and only four Provinces remain without the Provincial Agricultural Officer living and working in the Provincial Administration centre. These Provinces are Plateau, Benue, Kabba and Adamawa. The changeover has been delayed by lack of housing and office accommodation. Some Provinces have also established Agricultural Officers (Investigation), in order to achieve better coverage and co-ordination in experimental and investigational work. This is achieved through liaison with the Regional Research Station and extensive touring within the Provinces.

3. The rains have been remarkably good, being early, well distributed and finishing late, resulting in excellent crops, particularly groundnuts and cotton. The cereal crops were not as good as anticipated but were nonetheless good, and the food supply position has been adequate, with no reports of shortages.

4. As is usual, the Field Services staff have been engaged on a wide and varied programme of work ranging from the erection of cotton seed stores, seed multiplication and the extension of tree crop investigation in the Riverain Provinces, in addition to normal extension duties. The need to exploit the tree crops possibilities in the Riverain Provinces has long been felt, and the planting of oil palms, coffee and cocoa is proceeding steadily on a programme laid down by an expert.

5. "Mixed farming" has continued to expand, but the present high capital cost makes the operation of credit for this purpose a difficult task for the Native Administrations. Mixed farmers are now receiving assistance from the cattle multiplication centres which now supply improved bulls and heifers for breeding purposes.

6. Investigation and demonstration of pasture improvement continues in Kano and Katsina Provinces, where heavy human and stock population is making it difficult to maintain the existing herds. A further 600 acres of degraded pasture were treated and sown down. The results of these investigations also apply to the soil conservation work, and new schemes were started in five Provinces. Existing schemes were extended, notably at Langtang in Plateau Province, where a total area of 30 square miles has now been conserved, mainly by the farmers themselves.

7. The fertiliser scheme has reached a stage where the organisation of distribution and sales, now 40,000 bags, is becoming a heavy burden on Divisional staff. There are difficulties in the way of take-over by commercial enterprise, but one firm has agreed to take over distribution in S. Katsina on a trial basis. Experimental work has shewn that Fernasan D is more effective than coppercarbonate as a seed dressing and has the advantage of being an insecticide as well as a fungicide. Sale of Fernasan D is now being arranged through commercial channels. Fertiliser and seed dressing has been coupled with the popular Kano "K.50" groundnut seed multiplication scheme by issuing a £1 pack of seed, fertiliser and Fernasan D.

8. The new improved strain of cotton 26J has been injected into the multiplication scheme and should supply almost 15 per cent of the cotton seed requirements in the coming season. As the effect of the cotton seed stores becomes felt, considerable economy in the use of seed should be effected, which should offset the steady increase in the acreage of cotton planted.

STAFF AND ADMINISTRATION

1. The following list shows the establishment strength at the beginning of the year; at the end of the year; recruitment; and retirements.

2. There has been a slight all round improvement in the technical staff position, but the vacancy columns clearly shew the shortage of staff in the field. This is particularly marked amongst the junior staff.

3. Another limiting factor has been the shortage of clerical staff, especially in the provinces, so much so, that senior officers have had to spend too much time on clerical work which could have been more profitably spent in the field.

Staff and Administration

Post	Establishment	No of Staff					
		1-4-57		31-3-58		1-4-57—31-3-58	
		Strength	Vacancy	Strength	Vacancy	Joining	Leaving
Field Services Division:							
Deputy Director of Agriculture (Secy. F.S. w.e.f. 15-11-57) Assistant Director of Agriculture (Deputy S.F.S. 15-11-57) Principal Agricultural Officers	1	1	—	1	—	—	—
Senior Agricultural Officers	1	1	—	1	—	—	—
	13	7	6	7	6	—	—
	10	8	2	8	2	—	1 on leave due to retire 19-4-59.
Agricultural Officers	41	28	13	35	6	7	—
Agricultural Superintendents	84	62	22	60	24	—	2 contracts expierd.
Mechanical Demonstrators	9	6	3	9	—	3	—
Assistant Agricultural Superintendents	46	39	7	37	9	—	2 resigned.
Senior Agricultural Assistants	11	7	4	7	4	—	—
Agricultural Assistants, Grade I	26	8	18	8	18	—	—
Agricultural Assistants, Grades II and III	144	70	74	78	66	9	1 resigned.
Junior Agricultural Instructors	12	10	2	10	2	—	—
Agricultural Instructors, Grades I and II	172	91	81	86	86	—	5 { 2 resigned. 1 invalided 1 terminated. 1 dismissed.

N.B.—There was no allocation of Clerical staff to Division during the year 1957-58.

BUILDINGS

1. *Residential Quarters*.—There is little news to report. Two quarters were completed—a Kaduna type Moslem house for the Principal Agricultural Officer, Sokoto, and an Agricultural Officer's house at Gembu in Adamawa. Two other houses were under construction at the end of the year, one in Wukari in Benue and the other in Jos for the Principal Agricultural Officer, Plateau. The fact remains that a number of the field officers are living in sub-standard housing and often not in the best position for their work. It is proving very difficult to get houses and offices constructed away from the main centres.

2. In Kano a new office was completed at Dambarta, the centre of the groundnut multiplication scheme. A new incubator and brooder house was completed at Riyom, and is a vast improvement on the original building. A 300-ton rice store on Bida Farm was finished at the end of the year and a fertiliser store built at Kofare in Adamawa.

3. *Cotton Seed Store*.—A major building programme of these permanent, steel-framed, pan-sheathed stores was undertaken. 225 were ordered, 117 were completed at 31-3-58, 63 were building, leaving 45 on which work had not started. These will undoubtedly effect economy in seed, prevent losses through weather, and introduce control on distribution, and eliminate recurrent annual expenditure on temporary buildings.

FIELD SERVICES ACTIVITIES

THE SEASON: WEATHER

The rains were exceedingly good throughout, being early, well distributed and finishing late, with the end result benefiting most crops.

FOOD AND CASH CROPS

Cereals.—The millet crop was only average, largely due to heavy rains at harvest and in some areas heavy attack by Quelea. The guinea corn crop was well above average, while rice and maize, mainly in the Riverain Provinces, shewed increased acreages and yields. The food supply position was good at 31-3-58, with no likelihood of shortages.

Root crops.—Increased acreages of cassava are reported and yields were good. The yam crop was above average, but heavy yam beetle attack has been observed in parts of Benue, Plateau and Adamawa, and control methods are under investigation.

Sugar.—The crop has been average and red rot disease has not been so prevalent as in the past,

Tobacco.—The Nigerian Tobacco Company have their own extension service supplying seedlings and fertiliser to the farmer. Particulars of cured leaf purchased by the Company are as follows:—

<i>LB</i>			<i>LB</i>				
1946	...	...	171,040	1952	...	...	2,211,444
1957	...	...	82,272	1953	...	...	1,610,778
1948	...	...	217,120	1954	...	...	1,588,148
1949	...	...	300,715	1955	...	...	1,811,642
1950	...	...	735,865	1956	...	...	5,300,000
1951	...	...	1,315,316	1957	...	...	2,300,000

EXPORT CROPS

Groundnuts.—Total purchases of export groundnut for the years 1946-47 to 1957-58 are as follows:—

<i>Tons Purchased for Export</i>							
1946-47	...	...	322,699	1952-53	...	...	430,926
1947-48	...	...	329,581	1953-54	...	...	424,616
1948-49	...	...	328,072	1954-55	...	...	372,776
1949-50	...	...	188,118	1955-56	...	...	530,215
1950-51	...	...	142,526	1956-57	...	...	349,466
1951-52	...	...	418,255	1957-58	...	...	690,289

The above figures shew that the season has been the highest to date of groundnut production. The extremely high figure obtained was due to a number of factors, the major causes being increased acreage coupled with an extremely favourable season. A most unusual feature is that this outstanding increase in production has also carried with it a marked improvement in the sample of shelled nuts produced. For example, Kano Province reports that 95 per cent of the provincial crop is special grade, compared with 30 per cent last year. This is a really notable achievement, made possible by the introduction of hand operated decorticators.

Kano fifty Groundnut Seed Multiplication Scheme.—The third phase of the four year multiplication scheme was completed, with unexpectedly high yields of seed from stages II and III areas. Stages 0 and 1 grown on Kano and Dambarta farms produced a total of 20 tons of seed, while stages II and III grown by farmers produced 275 and 697 tons respectively. This should be able to supply some 35,000 farmers in the 1958 season with 40 lbs. seed each, made up into £1 packs containing fertiliser and seed dressing.

Cotton.—Total purchases of export seed cotton for the years 1946-47 to 1957-58 are shown as follows:—

<i>Tons Seed Cotton</i>							
1946-47	...	...	18,300	1952-53	...	...	47,041
1947-48	...	...	9,862	1953-54	...	...	73,191
1948-49	...	...	25,316	1954-55	...	...	94,745
1949-50	...	...	31,417	1955-56	...	...	77,335
1950-51	...	...	40,862	1956-57	...	...	69,423
1951-52	...	...	60,748	1957-58	...	...	119,813

The result of the good rains, both early and late, has had a most beneficial effect and all Provinces report considerable increases in seed cotton purchased, Sokoto, Katsina, Zaria and Bauchi having the largest increases in production. Furthermore, the ratio of cotton seed distributed to cotton seed purchased is widening, indicating better economy of seed and better growing technique. Intensive propaganda to maintain the cotton close season was not entirely successful, but no significant increase in disease incidence has been reported.

Cotton Seed Multiplication.—The organisation of the multiplication of improved strains of cotton has been maintained at Funtua and Gombe areas of Katsina and Bauchi Provinces. The old 26C variety is now being superseded by a new strain, 26J, which has been injected into the multiplication scheme. This has been greatly helped by the good season and 2,430 tons of seed were produced. This will represent nearly 15 per cent of the seed distribution for next season. The whole of the 26J seed was dressed with "Agrosan" against Blackarm disease, and this seed dressing will be extended in the coming season.

Benniseed.—Total purchases for export since 1946 to 1957 are shown as follows:—

<i>Tons</i>				<i>Tons</i>			
1946-47	...	...	4,085	1952-53	...	...	13,387
1947-48	...	...	8,605	1953-54	...	...	13,775
1948-49	...	...	15,642	1954-55	...	...	15,809
1949-50	...	...	13,385	1955-56	...	...	18,376
1950-51	...	...	9,188	1956-57	...	...	15,759
1951-52	...	...	10,387	1957-58	...	...	16,327

The crop grew exceedingly well, but heavy rain at harvest, especially in Tiv Division of Benue Province, was instrumental in reducing yields. The quality was, however, reported to be much improved on previous years, as a result of extensive propaganda by all concerned with the growing and marketing of this crop.

Soya Beans.—Purchases for Export between 1946-47 and 1957-58 were as follows:—

<i>Tons</i>			<i>Tons</i>		
1946-47	...	Nil	1952-53	...	3,888
1947-48	...	10	1953-54	...	8,731
1948-49	...	738	1954-55	...	9,109
1949-50	...	956	1955-56	...	9,598
1950-51	...	3,520	1956-57	...	15,758
1951-52	...	8,038	1957-58	...	15,036

This crop is very local, confined to Tiv Division of Benue Province and the Abuja area of Niger Province. The late rains made harvest difficult and caused a slight reduction in the general quality.

TREE CROPS

It has long been felt that more active development of tree crop possibilities should be undertaken in the Riverain Provinces, but this had to be delayed for a variety of reasons. It has now been possible to lay down a definite programme of tree crop development in this area, based on the recommendations of an expert who toured the Riverain Provinces intensively. Experimental plantings and pilot plantations are in hand and nursery technique is being developed. Planting material and advice is being made available to the farmer, and the whole operation is operated through the provincial organisation but co-ordinated by an Agricultural Officer who is whole time on these duties.

Cocoa.—This crop is mainly confined to Kabba Province, where 297 tons were purchased against 688 tons for the preceding year. Much of the crop is sold in the Western Region, but other reasons must be responsible for the loss in production. The previous year's heavy crop, followed by a severe dry season, increasing capsid attack and black pod thriving under the wet conditions, all played their part.

230 acres of cocoa were sprayed in Kabba against capsid, resulting in good control. Demonstration control against black pod was continued in Kabba, using Perenox spray. There is no doubt that capsid spraying is extremely popular with the farmer.

Kola.—16,000 kola seed from selected trees at Labozhi, in Niger Province, were distributed to fourteen stations in the Region. Plantations have been established in all the Riverain Provinces. As with oil palms, establishment is difficult with the fire hazard even more acute.

Recording of ninety-six selected trees continued at Labozhi, with a view to breeding work in the future.

Coffee.—Kabba Province remains the main producing area, where it is estimated some 200 tons of Robusta coffee are produced. The crop was normal, but the coffee berry borer continues to cause considerable

damage. Quality is generally low, and scattered production on very small farms makes improvement difficult, but it is hoped that the development of co-operatives will make it possible to achieve real improvements in quality in the near future. Distribution of planting material continues and, if prices are maintained, expansion of coffee growing should be rapid.

The small area of Arabica coffee on the Mambilla Plateau is expanding steadily and, while production of this strain will never be large, it should become of considerable local importance. Communication with this area is extremely difficult and the marketing of coffee presents several problems. At present the Native Administration purchases the coffee from the farmers, arranges its evacuation from the Plateau and resells to one of the leading firms in Yola.

Oil Palms.—No statistics are available to indicate the production of palm products but it is on a considerable scale, the greater part being for the internal market, although relatively small quantities of oil and kernels are exported.

The bulk of the production comes from neglected wild palms, but the value of the improved pollinated seed is beginning to be felt. A major advantage is the very early fruiting obtained from these planted palms and the ease of harvesting over a number of years. Germinators have been established at Ilorin and at Yandev in Benue Province, and from these centres distribution is arranged to provincial nurseries.

Small pilot plantations have been established by several local authorities and it is hoped that it may be possible to work out plantation techniques suited to the areas concerned. The most difficult problem is maintenance until the palms come into bearing. During the unproductive period it is difficult to maintain interest.

There is no doubt that the oil palm has an important part to play both in the nutrition and in the economy of the Region.

Fruit Nurseries.—The nursery coverage is now quite comprehensive and an even balance between Government and Native Administration establishments has been achieved. Nursery material covers citrus, mangoes, guavas, pawpaw and a few minor crops. Known issues were one-quarter of a million plants, the lions share again attributable to Bornu, and again in Bornu considerable numbers of trees were sold by private enterprise, mainly budded mangoes.

A Native Administration team in Benue sprayed all citrus on Government and N.A. farms and schools, using a mixture of Alpolineum, Perenox and Gammalin 20.

LIVESTOCK

Fulani and Farmers' Cattle.—The general level of health has been good in most Provinces. Bornu had a severe outbreak of Pleuro pneumonia, resulting in the slaughter of many animals.

Cattle Multiplication Centres.—There are eleven Cattle Multiplication Centres, all of which are in the Northern Provinces of the Region except one at Raav in Benue.

During the year fencing and the planting of Bagaruwu (*Acacia Arabica*) continued and the position is now much more satisfactory. The water problems on the Cattle Multiplication Centres have been solved, except at Kotarkoshi in Sokoto and Raav in Benue. Staffing has been reasonable except at Kukar Altanna in Katsina, where the lack of qualified staff has slowed progress. Cropping has been good and a start made with sown pastures, some of which look promising. Indeed, a most encouraging start has been made with pasture establishment, and the initial impression is that the goal of self-sufficiency with grass, hay, silage and grain will be achieved.

Health has been variable and the following list indicates some of the problems encountered. Darazo in Bauchi Province had liver fluke, while at Tumu, also in Bauchi, five cows were sold with mastitis. Kotarkoshi in Sokoto has a low fertility problem in their cows, and in the same Province at Talatar Mafara twenty-eight cows were sold for slaughter on reacting to the tuberculin test. The odd case of trypanosomiasis, heart water and scour has been reported from other Centres.

The initial emphasis with the Cattle Multiplication Centres was the supply of good breeding bulls of Shika stock to mixed farmers, to enable them to upgrade their cattle. However, the demand from farmers for female stock is such that more attention is now being paid to this aspect, and "Heifer Pools" have been established at Dogondaji in Sokoto Province, Kukar Aljana in Katsina Province and Gumel in Kano Province. At these, heifers are purchased, given all necessary inoculations and adequate feeding, and are then served by a pedigree bull before issue to farmers.

MIXED FARMING

The overall picture is one of expansion, improvement and optimism. All the main cattle Provinces show increased numbers and, in places, demand for ploughs is far in excess of supply. Two definite trends came out over the period, which are indicative of the farmer's willingness to accept cattle and ploughing as part of his farming system and which hold hope for the future. These are: (a) the willingness and ability of farmers to buy their own cattle and ploughs with an advance; and (b) the demand for female stock. The vast majority of mixed farmers in the North have been established with advances from the Native Administrations, which were in fact the only type of farmer credits available in the country. The burden of advances on many N.A.s has been indeed heavy, and the new trends are welcome signs of a changing system and are being encouraged.

Unit Farms.—The two Unit Farms at Yandev, in Benue Province, had a successful year.

The *Cattle Unit*, which was started several years ago to demonstrate mixed farming using cattle, showed a net profit of £116 1s 9d—i.e.,

approximately three times the amount which a labourer working throughout the year could earn on the minimum wage of 2s 4d per day. This unit is ten acres in size, of which $4\frac{1}{2}$ were under crop, and has two cows and followers.

The Sheep Unit, which is similarly formed except that eight sheep and followers replace the cattle, made a net profit of £74-18s-1d—i.e. approximately double what a labourer could earn on the minimum wage.

PASTURE IMPROVEMENT

In Kano and Katsina, with the aid of I.C.A. funds, 600 acres on communal grazing areas which were originally bare eroded "hurmi" land, were treated and sown down to Pennisetum and Andropogon grasses. Establishment was good on all but 150 acres. By the end of March, 1,000 acres of this type of land had been treated and was providing dry season grazing at an approximate rate of $3\frac{1}{2}$ acres per cow. Costs vary from £7-14s-0d per acre to establish, and maintenance runs to about £2 per acre, this being met by the Native Administration. In Katsina, four 50-acre blocks were likewise treated. They were surveyed, contoured, fenced, manured and re-seeded. Results have been variable and on the whole not very encouraging, but the experience gained should prove a valuable asset.

POULTRY

Riyom on the high Plateau, now the main poultry station, produced some interesting results in selections from native birds. Second generation females in their pullet year are averaging 180 eggs per year and egg size is coming into the 2 oz. mark. Hen body weights of 5 lb. and cock body weights of 6 lb. are common.

A virulent strain of fowl pox broke through the vaccine in November and resulted in a considerable number of R.I.R.S. being culled; losses in the native flock was negligible. Another interesting indication is emerging in connection with the Fowl Leukosis Complex, as this disease is apparently confined to imported exotic stock, no recorded cases in the native flock having so far come to light.

61,331 eggs were produced over the year and 16,218 were issued or sold for hatching. Hatchability varies at Riyom from nil (ducks) to 95 per cent (native). The ducks, Aylsbury, Khaki Campbell and Badageri, remain a problem with their low egg production and very low fertility, while the level of health of the birds is good. Variation in their rations, especially on the vitamin side, is being tried to remedy the situation.

FERTILISER CAMPAIGN

The fertiliser campaign, which is financed and administered by the Northern Region Development Corporation, has developed steadily from the original free issues through distribution by Native Administration organisations, to the use of village agents using traditional channels. The object is to hand over to commercial enterprise as early as possible, but the credit angle is still providing many difficulties. Ready cash tends to be devoted to immediate needs, and credit facilities do not fit in with commercial practice.

One firm has, however, agreed to take over distribution in the Funtua area on an experimental basis, to study the various problems involved from the commercial angle.

Distribution year by year since 1950 is shewn below:—

						<i>Free Issues— Super and S/A</i>	<i>Cash and Credit on Sales—Super and S/A</i>		
1950	...	...	...	...	...	30,000	Nil	56	} lbs bag
1951	...	...	...	...	...	67,000	25,000		
1952	...	...	...	...	...	32,000	23,000		
1953	...	...	...	...	...	135	27,806		
1954	...	...	...	...	...	64	24,477		
1955	...	...	...	...	...	113	28,189		
1956	...	...	...	...	...	424	51,977		} (40 lb. bag).
1957	...	...	...	...	...	2,030	38,987		

There has been a change over to 40 lb bags, partly to enable the old selling price per bag to be maintained and partly for care of handling. The drop in distribution is largely a result of the tightening up of the method of distribution and less direct contact between the Native Authority and the farmer in the distribution. In spite of this, the use and value of fertiliser is becoming more firmly established and more active interest is being shewn. The provinces where the greatest interest has been shewn are Kano, Katsina and Adamawa.

PESTS AND DISEASES

Locust swarms were reported from Bornu, Bauchi, Sokoto, Kano and Katsina, but no egg laying was observed or damage caused.

Quelea in Bornu caused widespread damage on millet and Masaka guinea corn, estimated at 20,000 tons of grain lost and resulting in an increase in cereal prices. Nesting and roosting habits of this bird were observed, with a view to a campaign against it in the coming year. From the study already carried out on this subject, it appears that the Quelea problem in Bornu is of a different magnitude from that experienced in other countries which have this pest. The inaccessibility of the nesting and roosting sites in the vicinity of Lake Chad poses problems of the utmost difficulty, particularly where these are in the reeds on the fringe of the lake.

SEED DRESSING

Although the Ministry arranged for the dressing of the 26J cotton seed for planting within the multiplication area, the only seed dressing advocated to the farmer was the use of Fernasan D. Distribution was arranged entirely through commercial channels and, although it was on sale in canteens in most areas, the contact between the farmer and the canteen is small and the necessary interest of market traders was not achieved. This

situation was aggravated by late arrival of the product. The very favourable season and relatively small smut incidence did not demonstrate the value of the dressing either for pre-emergence protection or for protection against smut. It is, however, a very cheap insurance policy and every effort is being made to extend its use, and the next bad year should give convincing proof of its value.

SOIL CONSERVATION

Small pilot conservation schemes were initiated at Mubi in Adamawa Province and at Gombe in Bauchi Province. In Kabba Province, 50 acres of steep land at Okene was bunded by Ferguson tractor and hand labour, while in Igala Division at Ochadam leper settlement, 100 acres were likewise treated. Katsina Province initiated four small schemes embodying contour bunding, ridging, hedging and water-course protection, constituting a total acreage of about 200. In Sokoto, a small pilot scheme of contour bunding was laid down at Birnin Kebbi near the N.A. garden, while at Dengi, stone terracing was done on about thirty acres.

Soil conservation is very much in its infancy and work is at present directed to demonstration to the farmer, who has little conception of the meaning of the term. Local experience in its application has also to be obtained, and little progress can be achieved until we have both farmer's acceptance and local experience. A notable example of what can be done, given both of these conditions, is the Langtang project in Plateau Province, where a further ten square miles was conserved, bringing the total to thirty square miles. Work on the large cut-off drains at the foothill is now nearly completed, and costs should fall and the work proceed at a faster rate.

Interest in the development of the conserved area remains high and the number of farmers owning work cattle is increasing. Badly eroded areas put down to trees are shewing good cover and the tree nurseries are well stocked.

Soil conservation measures on Ministry farms were continued as required and two short courses were held, one for senior and one for junior extension staff.

Towards the end of the year, the establishment of a Land Use Branch commenced, and soil conservation will, of course, form an integral part of this branch.

MOKWA AGRICULTURAL PROJECT

Rainfall was well distributed and above the average. A total of 52.25 inches was recorded, compared with the six-year average of 45.21 inches. As a result, it was possible to make an early start on the preparation and planting of crops, and excellent growing conditions resulted in considerably increased yields of all crops. The average yields per acre of the three main crops were as follows:

Guinea Corn—FaFara—900 lb. (from 391 acres);
Guinea Corn—Kaura—630 lb. (from 782 acres); and
Groundnuts—896 lb. (from 118 acres).

With these excellent results it was possible further to reduce the indebtedness of settlers from £1,498 to £930. At the same time, the number of settlers was reduced to thirty (as compared with fifty in the previous year) by the removal of unsuitable settlers and the voluntary return of a few settlers to their old villages.

The search for a suitable cash crop for Mokwa continued and was in fact the main feature of the experimental programme. As it was felt that it would be unfair to ask settlers to grow large areas of unproved crops, and as the search for an economic crop was very far from complete, it was decided to return to a system of direct farming at Mokwa. No further settlers were taken on, though those who wished to remain were allowed to do so, and to cultivate crops on more or less the same basis as before.

The work of the Agricultural Engineering branch was mainly concerned with completing the soil conservation programme in the West Ndayako section of the project, the preparation of land for cultivation, and the layout of the new experimental farm. The detailed system of costings was continued in order to provide accurate costs of mechanical operation and relate them to the economics of large-scale mechanical cultivation. The data collected is likely to yield valuable information after two or three years have been recorded.

AGRICULTURAL ENGINEERING

The function of the Engineering Section may be broadly divided into two parts. The first is to provide information and advice on the choice and operation of machines in the field and to carry out investigations with a view to producing machinery to suit special requirements. The second is to, service, in the workshop and in the field, the quite considerable plant carried, by the Ministry. This aspect of the work is unspectacular but involves considerable responsibility and a great deal of record keeping to maintain supervision of plant scattered all over the Northern Region.

A major problem which exists in most rural areas is the supervision of simple equipment and machines such as ploughs, groundnut decorticators, carts and the like. To obtain a more accurate impression of this need, a mobile workshop from the Engineering Section toured to an advertised itinerary. It was certainly extremely popular and, while the overheads of this type of plant were too heavy to enable economic prices to be charged, most valuable information was obtained. The main obstacle to this type of assistance is that senior staff supervision is necessary, and this is too expensive for the type of work and level of charges that can be made. The matter is now under consideration, and the possibility of training and equipping village blacksmiths to provide simple repair facilities is receiving attention.

AGRICULTURAL SHOWS

Agricultural shows were held in all provinces except Kano, where ploughing matches were held in lieu. These shows, mainly financed by the

Native Administration, provide excellent opportunities for putting over propaganda and techniques. The number of shows increases each year, and during the past year the following number of shows were held in each province:—

Zaria 2; Katsina 3; Sokoto 5; Bornu 5; Bauchi 7; Niger 6; Plateau 8; Benue 5; Kabba 2; Ilorin 5; Kano: 3 ploughing matches.

A heavy programme of trials, investigations and surveys has been carried out by officers of this Division. This programme will be dealt with under the report of the Research and Specialist Division and will not be described here.

SUMMARY

The farmers have had the best year in memory. Cash crops have been very good and if the cereal crops did not quite live up to early expectations, there has never been any suggestion of food being in short supply.

The investigation programme run by officers of the Field Services Division has been the heaviest yet attempted and much useful information has been obtained which will be of value to the farmer.

The senior staffing position and coverage has been vastly improved but the junior staffing and recruitment leaves much to be desired, and the contact with the farmer in the field is quite inadequate. The seriousness of the recruitment of junior staff cannot be over-stressed, especially from the point of view of the years ahead.

Part II.—Produce Inspection Division

GENERAL

Both the groundnut and cotton crops in 1957-58 were almost double the crops of the previous year and were easily the heaviest recorded crops in the Region. The staff of the Division dealt with both crops without undue difficulty or delay.

On the 15th November the former Department of Produce Inspection was integrated with the Ministry of Agriculture and became a Division of the Ministry.

Tables and statistics are at the end of this report.

STAFF

Details of the establishment for the year under review, the strength at the beginning and end of this period, and vacancies existing at 31st March, 1958 are shown in Table 1.

It will be observed that all senior posts are filled with the exception of those of one Produce Officer and one Pest Control Officer. During the year two officers, including one Northerner, were appointed as Produce Officers.

The number of direct entries into the grade of Produce Inspector/Assistant Produce Inspector was twenty-two compared with sixteen in the previous year.

No further secondments of Native Authority Cotton Examination Staff were made during the period.

ADMINISTRATION

Owing to the shortage of senior officers, Gombe was once again treated as a Seasonal Station only and a Produce Officer was posted there from mid-October, 1957 to mid-March, 1958.

All other Areas were continuously supervised by Officers not below the rank of Produce Officer apart from the following exceptions:—

- (a) Lokoja Area was unsupervised for a few days in March 1958, due to an unavoidable break in continuity when handing over the Area from one Officer to another;
- (b) During the period July to October 1957, there was no residential Produce Officer at Gusau, but the Area was supervised by Produce Officer, Funtua.

GAZETTED PRODUCE INSPECTION STATIONS AND MARKETS

There were 410 Gazetted Produce Inspection Stations and Markets in the 1957-58 season compared with 406 in the previous season. This increase of four is due to an increase of fourteen in the number of groundnut stations and a decrease of ten in the number of cotton markets (*see* Table 2).

GROUNDNUTS

SEASON

The 1956-57 Season closed on 9th May 1957. The 1957-58 season opened on 1st November 1957, for Kano Area Groundnuts and on 15th November 1957, for Rivers Area Groundnuts. The season was still open at the close of the year under review.

SPECIAL GRADE

The Scheme introduced by the Northern Region Marketing Board two years ago was continued with great success. Groundnuts of exportable quality containing not less than 70 per cent whole nuts by weight were purchased as Special Grade. The premium paid was £5 per ton above the Standard Grade prices compared with a premium of £3 10s per ton last season. Rivers Area Groundnuts were once again automatically awarded the £5 premium as Special Grade.

The success of this Scheme may be judged by the fact that up till 31st March, 1958, no less than 95.3 per cent of the 1957-58 Kano Area crop was Special Grade. These excellent results were due to:—

- (a) the high incentive offered as premium for Special grade;
- (b) the increasing use of decorticating machines as opposed to the traditional method of shelling by pestle and mortar;
- (c) the intensive publicity campaign instituted by this Division on behalf of the Northern Region Marketing Board; and
- (d) the whole hearted co-operation of the Licensed Buying Agents and their staff to go all out to purchase Special Grade.

It was decided to continue the system of visual grading during the season, but owing to the extremely large tonnages involved and this arbitrary method of grading, it is considered that in a good many instances the whole nut content was below the 70 per cent required for Special Grade. The improper use of decorticating machines further resulted in nuts being unnecessarily broken in the process of shelling. These machines, properly used, provide a good standard of Special Grade, but when overfilled the whole nut content may fall as low as 60 per cent. It is to be hoped that with the increase in the number of decorticating machines on the market that a great improvement will be seen next season.

As in the previous season, standard grade groundnuts have been given priority in evacuation to port.

Grading was carried out this season in Gazetted Inspection Stations only.

PURCHASES

As has been previously mentioned this Season's crop has been a record one. Up to the 31st March, 1958 a total of 690,289 tons had been purchased compared with 349,466 tons during the similar period last year. The following figures give brief details of the crop purchases, but fuller details and distribution between provinces appear in Table 3.

Total Purchases in Tons (Standard and Special Grades)

<i>Type of Groundnuts</i>	...	...	...	1957-58	1956-57	<i>Increase</i>
Kano Area	...	...	...	667,258	339,585	327,673
Rivers Area	...	...	...	23,031	9,881	13,150
Totals	...	...	...	690,289	349,466	340,823

PRICE

(a) *Kano Area*.—The basic ex-scale port of shipment prices for the 1957-58 season were as follows:—

								<i>Per ton</i>		
								£	s	d
Special Grade	...	...	...	...	...	...	...	47	10	9
Standard Grade	...	...	...	...	...	...	...	42	10	9

Prices at Gazetted Inspection Stations or Buying Stations were based on the above port prices less rail and road differentials. Buying prices were again subject to the deduction of £1 per ton for Produce Sales Tax.

(b) *Rivers Area*.—As in previous years the Rivers Area was divided into seven price zones with the buying prices per ton naked ex-scale at Gazetted Buying Stations varying between £38 and £32. These prices include the £5 per ton premium for Special Grade but are subject to the deduction of £1 per ton for Produce Sales Tax.

INSPECTION

The usual 10 per cent checktest was carried out on all groundnuts evacuated to Port or transferred to Oil Expressors in Kano. This checktest is to ensure that the groundnuts are of exportable standard, i.e., containing not more than 1 per cent extraneous matter of which not more than 0.2 per cent may be stones, laterite or other mineral content. Table 4 shows that 379,221 tons were subjected to such tests during the year under review compared with 415,284 tons the previous year.

Special Grade Groundnuts are also subject to an inspection test on arrival in a Gazetted Inspection Station to ensure that the whole nut content is not below 70 per cent and have been sealed once they have passed the test. As 95.3 per cent of the total purchases this season were Special Grade, it will be seen that the majority of all groundnut purchases were subjected to this initial test for whole nut content. Table 5 gives details of the total amount of 629,473 tons of Special Grade Groundnuts which were inspected by this Division from the opening of the season to the end of March 1958. It should be mentioned here that the difference between this figure and that shown in Table 3 as Special Grade Purchases (636,056 tons) is due to the fact that at the end of March, 1958 there was still a small quantity of Special Grade Groundnuts in outstations that had not been presented for the grading test.

Routine storage inspections were also carried out throughout the year on all groundnuts awaiting evacuation to port to ensure that pest infestation and deterioration were kept to an absolute minimum.

QUALITY

Laboratory tests at Kano have disclosed that the average impurity content of groundnuts for the last three seasons were as follows:—

<i>Season</i>			<i>Percentage of Shell, etc.</i>	<i>Percentage of total impurities</i>
		<i>Percentage of Stone</i>		
1955-56	...	...	0.118	0.223
1956-57	...	...	0.157	0.241
1957-58	...	...	0.152	0.201
				0.341
				0.398
				0.353

It will be seen that there is a slight improvement in this season's figures, but the Division is still making strenuous efforts for further improvement.

Average figures for other tests carried out in Kano Laboratory are as follows:—

					<i>Per cent</i>
(a) Oil Content	...	...	...	...	48.72
(b) Free Fatty Acid	...	...	...	...	1.34
(c) Moisture Content	...	...	...	...	4.19
(d) Whole Nut Content	...	...	...	...	66.67

DETERIORATION

Deterioration during the year amounted to only 106½ tons compared with 514 tons the previous year. This improvement in the deterioration figures is a direct result of quicker evacuation to port and closer storage supervision. Most of the deterioration was caused by compression of the bottom layers of bags in pyramids.

PEST INFESTATION

The Senior Pest Control Officer's report is contained in paragraph 58 onwards. During the year infestation of groundnuts by *Trogoderma Granarium* was as follows:—

April to November 1957 (1956/57 Crop)	...	...	4,615 tons
January to March 1958 (1957/58 Crop)	...	...	6,877 tons
Total	...	...	11,492 tons

The total figure for the previous year was 14,677 tons.

The 1956-57 Crop had the lowest infestation record of any crop since control started, namely 2.7 per cent.

Infestation in 1955-56 was 4.4 per cent.

The percentage infestation of the 1957-58 crop had already reached 1.02 per cent by the end of March 1958, and it is feared that this figure will increase considerably owing to the large tonnage of groundnuts in storage and the consequent risk of cross infestation.

GROUNDNUTS FOR LOCAL OIL EXPRESSION

Groundnuts released by the Northern Region Marketing Board to the four Oil Expressors in Kano during 1957-58 amounted to 87,627 tons of which 52,629 tons were 1956-57 crop and 34,998 were 1957-58 crop.

A total of 89,289 tons was released the previous year.

The above figures are based on those supplied by the Northern Regional Marketing Board's Agents for Oil expression and full details are contained in Table 6.

GROUNDNUTS EX-SUBSIDY STATIONS

Recently it has been the policy of the Northern Region Marketing Board that the buying price in any gazetted station shall not fall below £28 10s per ton for Special Grade and £23 10s per ton for Standard Grade. Up till the present crop season this has meant that nine gazetted stations in the extreme North-east of the Region have been subsidised. This season, however the slightly increased prices and reduced transport rates have resulted in prices at all stations being above the minimum standards. Subsidy stations, therefore, no longer existed as such during the 1957-58 season.

RIVERS AREA UNINSPECTED GROUNDNUTS

Total purchases of the 1957-58 crop (up to 31st March 1958) were 23,031 tons compared with 9,881 tons in the corresponding period of the previous year. This increase is an accurate reflection on the over-all increased purchases for 1957-58. (*See* Table 3).

KANO LABORATORY

Analyses of groundnut samples were undertaken throughout the year at the laboratory at Kano. The averages of these tests have already been mentioned in paragraph 5 (v).

The number of analyses carried out were:—

Mechanical	...	...	...	...	...	...	...	...	122
Chemical	...	...	...	...	...	...	...	...	122
Total									244

COTTON

OPENING AND CLOSING DATES OF SEASON

The season opened on various dates, the earliest being 22nd November, 1957 in northern Katsina and the latest being 3rd January, 1958, at certain markets in Benue and Niger Provinces.

COTTON MARKETS: DESIGN AND CONSTRUCTION

One permanent steel frame cotton market structure was erected during the year, bringing the total in use up to forty. These permanent markets have stood up to an extremely heavy season's marketing remarkably well.

The traditional type of market was, as usual, constructed by the Native Authorities.

COTTON CLASSES

Prior to the opening of the cotton season, cotton classes for cotton examination staff were held on various dates at the following centres: Kano, Zaria, Kontagora, Misau, Gombe, Numan, Gusau, Funtua, Dutsin-Ma, Bida and Lokoja.

BUYING ARRANGEMENTS AND PRICES

The Licensed Buying Agents of the Northern Regional Marketing Board were the same as last year, namely; British Cotton Growers Association, United Africa Company, John Holt and Company, P. S. Mandrides, S.C.O.A., C.F.A.O., London and Kano Trading Company, G. B. Oliviant, Patterson Zochonis, C. Zard, Alhaji Gagere, Alhaji Yakubu, H. Hallowi and Olude Stores.

Licenses to buy seed cotton were issued by Kano Headquarters and a total of 602 licences were issued to individuals buying for Licenced Buying Agents.

Prices paid during the season were, for the first time, based on a zonal flat price according to the Ginnery Zone in which the market was situated. These prices, after the deduction of Produce Sales Tax of one-tenth of a penny per pound, were as follows:—

Kuru, Zaria, Funtua, Malumfashi, Gusau, and Lokoja Ginnery Zones

Grade I	...	...	...	...	...	...	...	6.0d	per lb.
Grade II	...	...	...	...	...	...	...	5.5d	per lb.
Grade III	...	...	...	...	...	...	...	5.0d	per lb.

Mai-Inchi and Kontagora Ginnery Zones

Grade I	...	...	...	...	...	...	...	5.9d	per lb.
Grade II	...	...	...	...	...	...	...	5.4d	per lb.
Grade III	...	...	...	...	...	...	...	4.9d	per lb.

Gombe, Kumo and Misau Ginnery Zones

Grade I	...	...	...	...	...	...	...	5.8d	per lb.
Grade II	...	...	...	...	...	...	...	5.5d	per lb.
Grade III	...	...	...	...	...	...	...	4.8d	per lb.

Benue Ungraded Seed Cotton

4.9d per lb.

SUPERVISION OF COTTON MARKETING

Cotton Markets were again supervised by Headquarters Officers, Area Produce Officers, and, in some areas, Assistant Produce Officers. Native Authority Cotton Supervisors toured their Markets throughout the Season and on the whole they did their job reasonably well.

Owing to the very big groundnut crop it was decided that in certain Areas, Assistant Produce Officers and Produce Inspectors on supervisory duties should confine their supervision solely to groundnut marketing. There is little doubt that the standard of work in the Cotton Markets in these Areas dropped considerably due to lack of adequate supervision.

The various breakdowns of the 1957-58 purchase figures can be found in the following tables which appear at the end of this report.

Table 7 ... shows how the total purchases were divided between grades and Produce Inspection Areas.

Table 8 ... shows the provincial distribution of total purchases with comparative figures for the previous season.

Table 9 ... gives a precis of the purchases for the past four season (in grades) with the appropriate percentages.

QUALITY

From the produce inspection point of view, there has been a decline in the quality of this season's cotton. Such a decline is inevitable, to a great extent, with such a large crop. The larger the crop, the less careful will the

farmer be when picking, and this accounts for a larger proportion of unripe bolls, and leaf trash in the seed cotton offered for sale. Furthermore the very climatic conditions that are conducive to a large yield are also conducive to the breeding of pests, and it was noticeable that the cotton stainer was much more prevalent this year (*See Table 9*).

DOWNGRADING

Total downgradings for the 1957-58 season amounted to approximately 78 tons compared with $11\frac{1}{4}$ tons the previous season. This increase is due to the decline in the standard of the work in the Cotton Examination Staff in certain Areas (*See Table 10*).

MARKETING

Generally speaking the marketing of the 1957-58 crop was carried out quite satisfactorily bearing in mind the large tonnages involved.

One of the peculiarities of the season was that the bulk of the purchases were telescoped into a concentrated period of about six weeks duration (from the beginning of January to the middle of February, 1958). This fact accentuated the difficulties of marketing and inspecting a very large crop.

Once again middlemen were extremely active, particularly in Sokoto and Katsina Provinces; and the attendant adverse effects on correct grading were pronounced in these Provinces.

EVACUATION

Evacuation of the crop from markets to ginneries was carried out with only minor delays despite the large crop and the very bad condition of some of the dry season roads.

The following amounts were paid by this Ministry to Native Authorities on behalf of the Northern Regional Marketing Board in respect of £15 per mile grants for the maintenance of scheduled produce evacuation roads:

							£
Cotton evacuation roads	...	...	...	...	...	...	38,891
Oil seed evacuation roads	...	...	...	...	...	...	29,720

The large amounts of seed-cotton in storage at ginnery dumps has meant congested conditions at some ginneries, notably at Funtua. However ginning commenced from mid-December onwards. Produce Inspection Staff were again used on ginnery dump duties to good effect.

The new ginnery at Kano operated for the first time this season and has resulted in a much more equable distribution of markets in the Gombe Area.

BENUE SEED COTTON

PURCHASES

Purchases of Benue Seed Cotton amounted to 3,463 tons for 1957-58 compared with 2,514 tons purchased during the previous year—a substantial increase of 949 tons. (*See Table 11*).

BUYING ARRANGEMENTS AND PRICES

The United Africa Company and John Holts and Company were again the Licensed Buying Agents for Benue Cotton. The price paid, after deduction of Produce Sales Tax of one-tenth of a penny per pound, was 4.9d per lb., compared with 5.4d per lb. for the previous season.

MARKET AND MARKETING

As in the previous season thirteen markets operated during the season.

QUALITY

Seed cotton this season has been of poorer quality than in the past, because of excess stain and trash. The high rainfall was of course inductive to stainers, hence the reason for the excess.

EVACUATION

Evacuation to Lokoja Ginnery was carried out normally and no difficulties were experienced.

CAPSICUMS

Only 110½ tons of Capsicums were graded this year at the Gazetted Inspection Stations of Funtua, Bakori and Kano. This compares with 250 tons during the previous year. All capsicums graded were passed as Grade II.

The gradual reduction of the quantity of Capsicums graded is due to the fact that once the produce is graded it must be evacuated to port and shipped within two months or be subjected to a further inspection. Under these circumstances most of the Buyers arrange for Capsicums to be evacuated to port ungraded and have inspection carried out immediately prior to shipment.

PALM KERNELS

PURCHASES

A total of 13,070 tons of Palm Kernels were purchased and inspected during the year compared with 12,686 tons for the previous year—an increase of 384 tons (*see* Table 12).

MARKETING AND QUALITY

The 1957 Palm Kernel Marketing Scheme closed on 26th December, 1957, and the 1958 Palm Kernel Marketing Scheme opened on 3rd January, 1958. Prices were the same for both marketing years, namely, £31 per ton naked ex-scale at port of shipment. Prices paid at Buying Stations varied with the amount of Road/Rail/River transport and were also subject to the deduction of Produce Sales Tax at £1 per ton.

Quality was again satisfactory and there were no prosecutions in respect of sub-standard produce. Due to improved shipping facilities evacuation was carried out rapidly and congestion was negligible compared with previous seasons.

PALM OIL

PURCHASES AND GRADINGS

1,935 tons of Palm Oil were purchased during the year compared with 3,475 tons for the previous year. This decrease of 1,542 tons is accounted

for by the fact that producers were able to obtain higher prices in the local markets than those paid by the Northern Region Marketing Board. Full details of monthly purchases by grades appears in Table 13 with comparative figures for 1956-57.

MARKETING AND QUALITY

The 1957 Marketing Year closed on 26th December, 1957 and the 1958 Marketing Year opened on 3rd January, 1958.

The prices paid for Palm Oil, naked ex-scale delivered to Bulk Oil Plant, were unaltered as follows:—

						<i>Per ton</i>
						<i>£</i>
Special Grade Palm Oil	...	...	...	...	...	54
Technical Palm Oil Grade I	...	...	...	...	...	45
Technical Palm Oil Grade II	...	...	...	...	...	38
Technical Palm Oil Grade III	...	...	...	...	...	30

These prices were subject to a deduction of £1 per ton for Produce Sales Tax, and varied at Buying Stations with the amount of Road/Rail/River Transport differentials.

As in previous years no Technical Palm Oil below Grade I quality was purchased.

Quality was satisfactory and there were no prosecutions for adulteration. Evacuation was rapid and regular and no storage problems arose in view of the small tonnages involved.

COCOA

PURCHASES AND GRADING

301 tons of Cocoa were purchased and graded during the year compared with 715 tons for the previous year. This decrease of 414 tons is due to the yield being affected by prolonged wet weather and capsid trouble. Full details of purchases by grades for 1957-58 are contained in Table 14 together with comparative figures for 1956-57.

MARKETING AND QUALITY

The 1956-57 Cocoa Marketing Scheme closed on 15th August, 1957 and the 1957-58 Scheme opened on 13th September, 1957.

Prices of Cocoa naked ex-scale at port of shipment were as follows:—

					<i>Per ton</i>
					<i>£</i>
Main Crop and Light Crop Grade I	...	...	...	...	150
Main Crop and Light Crop Grade II	...	...	...	...	135

These prices were subject to a deduction of £4 per ton for Produce Sales Tax, and varied at Buying Stations with the amount of Road/Rail/River Transport differentials.

The greater part of the crop was again Main Crop Grade I and the quality was satisfactory.

No deterioration took place during the period under review as evacuation was carried out rapidly—the small crop presenting no difficulties in this respect.

BENNISEED

Benniseed is not an inspected produce but out-turn reports on this commodity from the United Kingdom some three years ago indicated that the crop was containing too large a proportion of extraneous matter.

Consequently in 1956 a voluntary inspection scheme was instituted by this Division and this scheme was again carried out in 1957. The Produce Officer at Lokoja was put in charge of a twelve men inspection team centred around Makurdi and Gboko. Licensed Buying Agents, gave full co-operation and considerable quantities of Benniseed were inspected. The method of inspection was that a twenty five ounce sample was drawn from each parcel of Benniseed submitted for inspection. This sample was passed through a course and a fine sieve and the resultant extraneous matter was weighed. If this was not more than half an ounce (i.e. not more than 2 per cent) the benniseed was passed as exportable quality.

Out-turn reports from the United Kingdom have since indicated that the scheme has been successful.

PROSECUTIONS

The following is a summary of prosecutions during the year:—

<i>Cases Tried</i>	<i>Acquitted</i>	<i>Pending</i>	<i>Convictions</i>	<i>Fines</i>
17	1	Nil	16	£52-10s

ERECTION AND MAINTENANCE OF TEMPORARY BUILDINGS

ERECTION

The sum of £599-10s was expended on building on extension to the Produce Office at Funtua.

MAINTENANCE

Maintenance Costs on existing buildings amounted to £689-10s-11d divided between Produce Inspection Areas as follows:—

									£	s	d
Funtua	...	...	...	...	...	...	...	...	123	4	9
Maiduguri	...	...	...	...	...	...	...	...	17	12	8
Gombe	...	...	...	...	...	...	...	...	51	7	0
Lokoja	...	...	...	...	...	...	...	...	27	18	6
Zaria	...	...	...	...	...	...	...	...	94	8	0
Kano	...	...	...	...	...	...	...	...	275	0	0
Gusau	...	...	...	...	...	...	...	...	100	0	0
Total									£689 10 11		

PEST CONTROL UNIT

INTRODUCTION

Once again the principal activities of the Pest Control Unit were centred about the control of insects and rodents infesting Northern Region Marketing Board Produce. In order that advantage could be taken of latest developments in insecticides, machinery, and other materials a full quota of experiments and trials was conducted, many such experiments were carried out in conjunction with the West African Stored Products Research Unit.

The year was one of steady progress, with the introduction of the universal use of 'Malathion' good control of *Tribolium Castaneum* was achieved and it is considered that this fact alone was by far the most important development during the year.

INSECTICIDES

Since the formation of the Pest Control Unit in 1949 universal use had been made of the Chlorinated Hydrocarbon Insecticide in the form of DDT or BHC (Lindane). It had been noted for some time that *Tribolium Castaneum* (the principal insect infesting groundnuts) appeared to have developed a most marked resistance to this type of insecticide. In addition to this short-coming the Khapra Beetle (or *Trogoderma granarium*) was to all intents and purposes completely resistant.

In June, 1957 a series of experiments was laid down in Kano using the Organo-Phosphorus Insecticide known as Malathion. This was a completely 'different' type of insecticide, and it was therefore to be expected that resistance would be non-existent. In addition Laboratory tests showed that under Northern conditions persistency was much greater than the 9 day period to be expected from BHC. Tests also showed that it was possible to control *Trogoderma granarium* by the use of Malathion.

The results of the experiments were most encouraging and it was decided that the use of BHC would be completely abandoned except in Bornu Area where resistance was apparently much lower. Malathion has about the same toxicity as DDT and in the absence of a maximum permissible average contamination figure for this insecticide it was decided to use the figure of 8 parts per million, spraying schedules were drawn up and Malathion came into full use towards the end of the year.

In addition to the use of 25 per cent Wettable Powder a new technique of dusting under sisalkraft paper with a 'Motoblo' dusting machine using 4 per cent Malathion Dusting powder was worked out, here again the results were most encouraging, unfortunately a hitch occurred over the supply of dusting machines and this technique is not yet in universal use.

SPRAYING MACHINES

The specially adopted Lister Orchard Sprayers were used again for the main routine spraying (SS2's and SS4's). These machines have given really excellent service, but the whole spraying team rigs were considered to be

of a somewhat 'Heath Robinson' nature. During the year an Allman Model 100 spraying machine was received for test. This machine was completely self contained and capable of being run off the power take off of a Land Rover or Tractor. Initial tests disclosed two major shortcomings. One of these had been satisfactorily solved at the close of the year and the other is still outstanding. It is doubtful whether this type of machine will be found suitable for the arduous and unusual conditions under which it will have to work.

MOTOBLO MISBLOWER

This small power (60 cc) operated knapsack sprayer and duster was tested during the year. As a spraying machine its application was found to be very limited, but excellent results were produced when used to dispense 5 per cent Dusting powder. Three more were ordered towards the close of the year and it is hoped to equip all spraying teams.

TODD INSECTICIDE FOG APPLICATOR

During the period of intensive night flight by *Tribolium castaneum* use was made of two of the above machines using 5/50 Pybuthrin as a 'knock-down'. Operations were started about one month before 'coverage' date and ceased when all pyramids had been covered with tarpauline.

PROPHYLACTIC MEASURES

The four spraying teams continued to operate throughout the year with the exception of the Nguru line stations. Their operations had to be suspended in late August as the road became impassable even to the tractor which was fitted with twin rear wheels. The stack position in the stations affected was such that no great harm was done by the cessation of operations. The team responsible for visiting Kaura Namoda, Funtua and Gusau was able to maintain its full schedules as was the Maiduguri-Potiskum team.

Night spraying of pyramids and dumps was started as a routine early in the new year. This had two very distinct advantages:

- (a) Wind was almost negligible and 'drift' kept to a minimum.
- (b) Movement of insects was greater and 'contacts' therefore more numerous.

Suitable illumination was rigged on vehicles and small trolleys and the operations were most successful.

In addition to carrying out spraying duties connected with N.R.M.B. produce practical help was afforded to various N.As. particularly to Kano where all Kano N.A. grain stocks were placed on the regular spraying schedule.

FRENCH GROUNDNUTS

Stocks of Groundnuts in the three French Groundnut Transit stations—Kano, Gagarawa and Kaura Namoda were subjected to the same

prophylactic measures as were the Nigerian groundnuts. No charge was made for this service. It was not necessary to carry out control measures for *Trogoderma granarium* on any French Produce.

GROUNDNUT CAKE

This commodity continued to be a source of heavy *Trogoderma* Infestation. The stores of one Miller in Kano are heavily infested with *Trogoderma granarium* and it is not possible to rid the premises of the Beetle without costly fumigation operations. Unfortunately the control of Pests in Groundnut cake is not covered by legislation and any measures taken by the Millers must be on a voluntary basis. Towards the latter part of the year four reports were received from the United Kingdom Ministry of Agriculture about *Trogoderma* infested cake and groundnuts from Nigeria. All the infestations were traced conclusively to these particular premises, and the groundnuts were no doubt cross infested from the cake.

Co-operation in the matter of Pest Control in groundnut cake has been quite good, as good as voluntary co-operation can be. During the year it was however necessary to fumigate 5,520 of *Trogoderma* infested cake to guard against spread of the pest. These fumigations were done entirely free of charge. In addition all groundnut cake stores were regularly sprayed also free of charge. It was considered that unless these measures were taken a serious threat to stored groundnuts (and other produce) would exist.

SISALKRAFT PAPER

Sisalkraft paper was again used everywhere as a dunnage on which to store groundnuts. Unfortunately stocks were exhausted towards the close of the year due to the extremely heavy crop and the failure of certain Licenced Buying Agents to carry out instructions (almost double the previous season figure) and use had to be made of Groundnut Husk as a dunnage. This material formed an excellent base on which to stack but it also provided a good breeding ground for insects.

RUBEROID

During the year experiments were laid down using Bitumenised roofing felt as a dunnage instead of Sisalkraft paper. Sisalkraft paper was very good but suffered from two main drawbacks.

- (a) It was not 100 per cent Moisture Vapour Proof.
- (b) Being 'paper' it was regarded as expendable and proper care was not taken of it. In fact the material cost £30 to cover one pyramid base.

Roofing felt appears to overcome these two objections and the cost is roughly the same. Results of experiments will be available in August-September, 1958.

RODENT COTTON

Rodent Control of stored groundnuts was further intensified during the year. All Pest Assistants were instructed in this matter and operations

were started in every groundnut storage station. The material used was 'Warfarin 5K' in a suitable base. It was found most difficult to control rodent infestation in pyramid areas because it appeared that unlike a warehouse (say in a large town) there was no such thing as a completely resident population which when once exterminated would leave the premises free. Although the kill in and around pyramids was satisfactory it was found that a further invasion took place immediately from the surrounding area (in many cases 'bush').

FUMIGATION WITH METHYL BROMIDE

Table 15 shows in detail the tonnages of produce and other materials fumigated during the year.

The fumigation figures for groundnuts showed a sharp fall for 1957-58 but in fact infestation rose sharply in the last two weeks of the year and the indications were that the tonnage of infested 1957-58 groundnuts would far exceed the 1956-57 crop.

In February, 1958 a request was received from the Officer in charge of the Groundnut Multiplication centre at Dambatta to control a heavy outbreak of *Aphanus sordidus* which was infesting seed groundnuts and store fabric. The entire stock of groundnut, including the stores themselves were fumigated and sprayed with Malathion. Reports indicated that the measures taken were most successful.

In September and November assistance was given to Nigeria Tobacco Company Zaria when 211 tons of leaf tobacco infested with *Lasioderma serticorne* were fumigated. These operations were carried out at cost.

Fumigation to control *Trogoderma Granarium* was also carried out for Sokoto and Hadejia N.As, and Mokwa Resettlement Scheme. Several operations were also carried out in the Sabon-Gari market at Kano. It was considered that time and money was well spent in controlling such outbreaks as a mean of preventing cross infestation to export crops.

KAURA NAMODA

As a result of reports by the Unit's research team a full scale *Trogoderma* survey was made at Kaura-Namoda in June-July, 1957. In all thirty-two separate occurrences of *Trogoderma* were found infesting 726 tons of various local food stuffs. It was estimated at that time that probably as much as 20 per cent of the total weight of these stocks had been lost through the depredations of these insects. In view of the real danger of cross infestation to groundnuts for export all occurrences were dealt with by fumigation with Methy Bromide, and in addition all premises were treated with 1 per cent Malathion.

No reports of Infestation of Groundnuts with *Trogoderma* had been received by the end of the year and it can therefore be assumed that the above measures contributed largely to this satisfactory state of affairs.

Inspections made at Kaura Namoda towards the end of the year showed that although infestation in domestic corn stocks was much less there was evidence that it was re-asserting itself.

As a result of the findings in Kaura Namoda a survey of all corn stocks in Stations in which groundnuts were stored was made. It was noted that evidence of such infestations was quite heavy, and control measures were put into operation whenever possible.

TABLE 1.—STAFF—ESTABLISHMENT AND STRENGTH 1-4-57 TO 31-3-58

<i>Post</i>	<i>Establishment 1957/58</i>	<i>Strength at 1-4-57</i>	<i>Strength at 31-3-58</i>	<i>Vacancies at 31-3-58</i>
Secretary	1	1	1	—
Principal Produce Officer	1	1	1	—
Senior Produce Officer	1	1	1	—
Produce Officer	9	7	8	1
Accountant	1	1	1	—
Executive Officer	1	1	1	—
Senior Pest Control Officer	1	1	1	—
Pest Control Officer	2	2	1	1
Assistant Produce Officer	19	16	14	5
Produce Inspector, Grade I	27	27	26	1
P.I., Grades II and III and Assistant P.I.	157	138	149	7
Produce Examiners	119	106	106	13
Chief Clerk	1	1	1	—
Assistant Chief Clerk	1	1	1	—
1st Class Clerk	7	5	7	—
2nd and 3rd Class Clerks, Ungraded Clerks and Clerical Assistants	33	29	26	7
Accounting Assistant	1	1	1	—
Driver Mechanic	3	3	3	—
Motor Driver	4	4	4	—
Telephone Attendant	1	1	1	—
Messenger	13	12	13	—
Nightwatchman	11	11	11	—
Stores Assistant	1	1	1	—
Fumigation Foreman	1	1	1	—
Pest Control Assistant	6	6	6	—
2nd and 3rd Class Technical Assistant	1	—	—	1
Stenotypist, Grades I, II or III	1	—	—	1

TABLE 2—TABLE SHOWING PROVINCIAL DISTRIBUTION OF ALL GAZETTED
INSPECTION STATIONS AND MARKETS FOR 1957-58 SEASON WITH COMPARATIVE
TOTAL FOR 1956-57 SEASON

Province	Adamawa	Bauchi	Benue	Bornu	Ilorin	Kabba	Kano	Katsina	Niger	Plateau	Sokoto	Zaria	1957-58 Total	1956-57 Total	In- crease	De- crease
Groundnuts	—	1	—	17	—	—	21	11	1	2	10	7	70	56	14	—
Cotton																
Markets																
(Including																
Benue	18	45	9	12	1	11	16	56	30	9	48	45	300	310	—	10
Ungraded)	—	—	—	—	—	—	1	2	4	1	1	1	10	10*	—	—
Capsicums	—	—	—	—	—	10	—	—	—	—	—	—	10	10	—	—
Cocoa	—	—	—	—	—	10	—	—	—	—	—	—	10	10	—	—
Palm Oil	—	—	—	—	—	—	—	—	—	—	—	—	10	10	—	—
Palm	—	—	—	—	—	—	—	—	—	—	—	—	10	10	—	—
Kernels	—	—	—	—	—	10	—	—	—	—	—	—	10	10	—	—
Totals ...	18	46	9	29	1	41	38	69	35	12	59	53	410	406	14	10

*Advised as 9 in 1956-57 Annual Report.

Net increase 4.

TABLE 3—COMPARATIVE PURCHASES OF GROUNDNUTS BY PROVINCES
(UP TO 31ST MARCH)
(a) Kano Area (Special and Standard Grades) in tons

Province	1957-58			1956-57			Increase	Decrease
	Special	Standard	Total	Special	Standard	Total		
Kano	336,587	8,774	345,361	62,730	115,930	178,660	166,701	—
Katsina	89,811	3,945	93,756	13,124	26,125	39,249	54,507	—
Sokoto	79,059	2,349	81,408	12,363	31,111	43,474	37,934	—
Zaria	10,572	2,334	12,906	1,867	2,703	4,570	8,336	—
Bornu	96,393	9,818	106,211	31,691	31,926	63,617	42,594	—
Bauchi	9,553	3,952	13,505	1,335	5,266	6,601	6,904	—
Plateau	13,408	30	13,438	2,917	497	3,414	10,024	—
Niger	673	—	673	—	—	—	673	—
Totals	636,056	31,202	667,258	126,027	213,558	339,585	327,673	—

Percentage of Special Grade 95.3 per cent.

(b) Rivers Area (All Special Grades) in tons

Province	1957-58			1956-57			Increase	Decrease
	Special	Standard	Total	Special	Standard	Total		
Benue	...	...	...	1,283	90	1,193	—	—
Adamawa	...	...	...	17,052	6,534	10,518	—	—
Niger	...	...	...	162	150	12	—	—
Bauchi	...	...	...	2,415	751	1,664	—	—
Bornu	...	...	...	412	257	155	—	—
Sokoto	...	...	...	—	1,360	—	1,360	Net Increase
Plateau	...	...	...	1,070	736	971	—	—
Kabba	...	...	...	—	3	—	3	—
Totals	23,031	9,881	14,513	1,363	13,150	—	—	—

Kano Area: Increase 327,673
Rivers Area: Increase 13,150
Total Crop Increase 340,823

TABLE 4—TONNAGES INSPECTED DURING 1957-58 AT TIME OF RAILMENT OF
TRANSFER TO OIL EXPRESSORS WITH COMPARATIVE 1956-57 FIGURES

In tons

<i>Months</i>	1957-58	1956-57
April	15,452	29,456
May	24,563	41,406
June	20,355	29,129
July	14,193	28,411
August	20,655	51,598
September	9,468	30,255
October	8,719	20,833
November	62,766	30,911
December	51,193	39,506
January	64,938	48,611
February	46,391	34,871
March	40,528	30,297
Totals	379,221	415,284

1957-58 total includes 87,627 tons transferred to Oil Expressors.

1956-57 total includes 89,289 tons transferred to Oil Expressors.

TABLE 5—1957-58 CROP SPECIAL GRADE GROUNDNUTS GRADED BY THE
PRODUCE INSPECTION DIVISION FROM 1-11-57 TO 31-3-58

In tons

<i>Months</i>	<i>Quantity</i>
November	137,022
December	170,147
January	180,233
February	85,541
March	56,530
Total	629,473

TABLE 6—TRANSFERS TO OIL MILLS 1957-58

In tons

<i>Months</i>	1956-57 <i>Crop</i>	1957-58 <i>Crop</i>	<i>Total</i>
April	7,670	—	7,670
May	7,940	—	7,940
June	5,763	—	5,763
July	7,035	—	7,035
August	8,015	—	8,015
September	6,600	—	6,600
October	7,200	—	7,200
November	2,402	4,648	7,050
December	—	7,700	7,700
January	—	7,850	7,850
February	4	7,150	7,154
March	—	7,650	7,650
Totals	52,629	34,998	87,627

TABLE 7—1957-58 SEED COTTON PURCHASES BY AREAS

<i>Produce Inspection Area</i>				<i>Grade I (lbs.)</i>	<i>Grade II (lbs.)</i>	<i>Grade III</i>	<i>Total (lbs.)</i>	<i>Tons</i>	<i>Total</i>		
									<i>Cwt.</i>	<i>Qrs.</i>	<i>Lbs</i>
Funtua	...	...	...	67,814,785	6,116,615	1,323,890	75,255,290	33,596	2	0	26
Maiduguri	...	...	...	4,197,159	1,596,040	448,985	6,242,184	2,786	13	3	4
Gombe	...	...	...	32,429,326	9,123,350	6,799,891	48,352,567	21,585	19	1	11
Zaria	...	...	...	43,116,348	5,811,344	1,192,918	50,120,610	22,375	5	1	22
Gusau	...	...	...	56,948,160	15,985,503	2,073,860	75,007,523	33,485	10	0	3
Kano	...	...	...	3,898,380	2,827,720	1,828,281	8,554,381	3,818	18	1	17
Lokoja	...	...	...	2,054,884	2,277,360	1,484,752	5,816,996	2,596	17	1	24
Totals	...	...	...	210,459,042	43,737,932	15,152,517	269,349,551	120,245	6	2	23

TABLE 8—PROVINCIAL DISTRIBUTION OF SEED COTTON PURCHASES FOR
1957-58 WITH COMPARATIVE FIGURES FOR 1956-57

In tons

<i>Province</i>						<i>1957-58 Purchases</i>	<i>1956-57 Purchases</i>	<i>Increase</i>	<i>Decrease</i>
Adamawa	...	...	...	...	...	2,758	1,807	951	—
Bauchi	...	...	...	...	...	19,102	14,507	4,595	—
Benue	...	...	...	...	...	1,058	648	410	—
Bornu	...	...	...	...	...	3,197	1,429	1,768	—
Ilorin	...	...	...	...	...	44	88	—	44
Kano ...	...	...	...	...	...	4,064	2,251	2,468	—
Katsina	...	...	...	...	...	33,596	17,086	16,510	—
Niger	...	...	...	...	...	7,077	3,921	3,156	—
Plateau	...	...	...	...	...	2,031	1,292	739	—
Sokoto	...	...	...	...	...	33,724	17,959	15,765	—
Zaria	...	...	...	...	...	13,594	8,437	5,157	—
Totals	...	...	...	...	...	120,245	69,425	51,519	44

Net increase 50,388 tons

TABLE 9—SEED COTTON PURCHASES FOR 1957-58 (IN GRADES) SHOWING
PERCENTAGES AND COMPARATIVE FIGURES
In Tons

	<i>Crop year</i>	<i>Grade I</i>	<i>Grade II</i>	<i>Grade III</i>	<i>Total Purchases</i>	<i>Percentage of Total Purchases</i>		
						<i>Grade I</i>	<i>Grade II</i>	<i>Grade III</i>
1954-55	...	60,150	26,087	8,508	94,745	63.5	27.5	9
1955-56	...	55,926	14,817	6,592	77,335	72.4	19.1	8.5
1956-57	...	57,641	9,065	2,719	69,425	83	13	4
1957-58	...	93,955	19,526	6,764	120,245	78	16	6

TABLE 10—DOWNGRADINGS, 1957-58

In lbs

<i>Produce Inspection Area</i>	<i>Grade II</i>	<i>Grade I to</i>		<i>Grade II to</i>		<i>Grade III to No Grade</i>
		<i>Grade III</i>	<i>No Grade</i>	<i>Grade III</i>	<i>No Grade</i>	
Funtua	24,738	5,936	—	100	—	—
Maiduguri	20,313	—	—	—	—	—
Gombe	—	5,510	—	—	—	—
Lokoja	—	—	2,000	—	—	—
Zaria	4,400	100	—	700	—	—
Kano	5,800	—	—	400	—	—
Gusau	101,825	1,305	531	970	—	—
1957-58 Totals	157,074	12,851	2,531	2,170	—	—
1956-57 Totals	19,824	4,700	100	376	—	200

1957-58 Total downgradings 174,626 lbs = 77 tons 19 cwts 0qrs 18 lbs

1956-57 Totals downgradings 25,200 lbs = 11 tons 5cwts.

TABLE 11—PURCHASES OF BENUE SEED COTTON FOR 1957-58 WITH COMPARATIVE FIGURES FOR 1956-57

In tons

<i>Month</i>					<i>Purchases, 1956-57</i>	<i>Remarks</i>	<i>Purchases, 1957-58</i>	<i>Remarks</i>
April					582	} 1955-56 Season	842	} 1956-57 Season
May					546		121	
June					—		—	
July					—		—	
August					—		—	
September					—		—	
October					—		—	
November					—		—	
December					—		—	
January					89	} 1956-57 Season	285	} 1957-58 Season
February					487		547	
March					810		1,668	
Totals					2,514		3,463	Increase of 949 tons

TABLE 12.—PURCHASES OF PALM KERNELS FOR 1957-58 WITH COMPARATIVE FIGURES FOR 1956-57
In tons

<i>Month</i>	<i>1957-58 Purchases</i>	<i>1956-57 Purchases</i>
April	1,159	1,164
May	1,899	1,502
June	1,678	1,708
July	1,360	1,398
August	830	1,443
September	678	883
October	833	799
November	925	994
December	750	691
January	809	618
February	854	691
March	1,295	795
Totals	13,070	12,686

Increase of 384 tons.

TABLE 13.—PURCHASES OF PALM OIL FOR 1957-58 WITH COMPARATIVE FIGURES FOR 1956-57
In tons

<i>Month</i>	<i>1957-58</i>			<i>1956-57</i>		
	<i>Special Grade Palm Oil</i>	<i>Technical Palm Oil, Grade I</i>	<i>Total</i>	<i>Special Grade Palm Oil</i>	<i>Technical Palm Oil, Grade I</i>	<i>Total</i>
April	51	465	516	114	714	828
May	102	621	723	68	1,055	1,123
June	69	201	270	60	611	671
July	49	6	55	78	161	239
August	20	—	20	75	—	75
September	41	—	41	41	10	51
October	32	—	32	47	4	51
November	75	—	75	104	3	107
December	14	—	14	92	8	100
January	11	—	11	11	30	41
February	1	—	1	9	14	23
March	—	175	175	44	122	166
Totals	465	1,468	1,933	743	2,732	3,475

Decrease of Special Grade Palm Oil 278 tons
Decrease of Technical Palm Oil, Grade I 1,264 „
Total Decrease 1,542 „

TABLE 14.—PURCHASES OF COCOA FOR 1957-58 WITH COMPARATIVE
FIGURES FOR 1956-57
In tons

<i>Month</i>	1957-58					1956-57				
	<i>Main Crop, Grade I</i>	<i>Main Crop, Grade II</i>	<i>Light Crop, Grade I</i>	<i>Light Crop, Grade II</i>	<i>Total</i>	<i>Main Crop, Grade I</i>	<i>Main Crop, Grade II</i>	<i>Light Crop, Grade I</i>	<i>Light Crop, Grade II</i>	<i>Total</i>
April ...	—	—	—	—	—	—	—	2	—	2
May ...	—	—	—	—	—	—	—	—	—	—
June ...	—	—	—	—	—	—	—	—	—	—
July ...	—	—	—	1	1	—	—	—	—	—
August ...	—	—	—	1	1	4	—	22	—	26
September ...	3	—	—	—	3	12	—	—	—	12
October ...	16	1	—	—	17	92	—	—	—	92
November ...	47	—	—	—	47	153	—	2	—	155
December ...	61	5	—	—	66	113	—	—	—	113
January... ..	86	1	1	—	88	150	—	12	1	163
February ...	60	1	3	—	64	7	—	108	9	124
March ...	—	1	13	—	14	—	—	20	8	28
Totals ...	273	9	17	2	301	531	—	166	18	715

Decrease of 414 tons.

TABLE 15—FUMIGATION STATISTICS: 1956-57-57-58

Month	Groundnuts Fumigated		Gas Used Lbs		E. Bags		Tarps		Sisalcraft Tons		Grains Tons		Beans Tons		Groundnut Cake		Tobacco		Animal Food	
	56-57	57-58	56-57	57-58	56-57	57-58	56-57	57-58	56-57	57-58	56-57	57-58	56-57	57-58	56-57	57-58	56-57	57-58	56-57	57-58
April	—	12,040	213	2,460	—	—	—	—	—	—	80	169	—	—	—	—	—	—	—	20
May	2,631	505	546	156	—	—	440	1,350	4	—	—	117	—	—	—	—	—	—	—	—
June	800	—	189	210	—	—	200	1,006	1	160	—	854	—	—	—	—	—	—	—	—
July	2,480	1,176	670	454	1,300	—	1,235	310	—	—	250	774	2	82	—	—	—	—	—	—
August	3,602	1,306	942	611	—	—	—	604	—	—	—	831	288	—	370	850	—	—	—	—
September	1,545	—	505	271	5,331	—	1,388	563	5	—	15	332	2	—	200	559	—	183	—	—
October	722	—	550	278	11,250	—	723	569	1	—	500	43	—	—	200	559	—	—	—	—
November	—	—	194	579	43,539	—	1,100	471	15	1	18	14	—	—	1,300	860	—	28	50	—
December	—	3	19	102	—	—	635	—	1	—	—	550	—	—	—	1,715	—	—	—	—
January	790	1,617	250	413	37,297	—	—	—	2	—	395	7	—	—	—	320	—	—	—	—
February	2,819	668	654	200	23,500	—	158	102	—	—	243	—	—	—	—	500	—	—	—	—
March	10,734	2,513	2,192	648	—	—	—	—	—	—	—	—	—	—	—	716	—	—	—	—
Totals	26,123	19,828	6,924	6,382	122,217	201,361	5,879	4,975	29	161	2,001	3,691	292	84	1,870	5,520	647	211	50	20

Part III.—School of Agriculture, Samaru

STAFF

The staff position was satisfactory throughout the year and at 31st March, 1958, was as follows, excluding officers on leave:—

One Principal; Five Agricultural Superintendents; one Acting Agricultural Superintendent; one Executive Officer; seven Assistant Agricultural Superintendents; two Agricultural Assistants; four Agricultural Instructors (three Temporary); seven Clerks of various grades.

STUDENTS

To 31st December, 1957 the numbers were as follows:—

<i>Class</i>	<i>No. at 1-4-57</i>	<i>No. left</i>	<i>No. joined</i>	<i>No. sat exams in November 1957</i>	<i>Number Passed</i>	<i>Number Failed</i>
A.A.S.	8	Nil	1	9	9	Nil
2nd Year A.A.s	10	1	Nil	9	9	Nil
1st Year A.A.s	30	4	Nil	26	18	*
N.A. Junior	30	Nil	Nil	30	27	3

* Eight 1st year A.A. students were referred and must re-sit certain papers.

1958 started with a very great increase in student numbers and between 1st January, 1958 and 31st March, 1958 the position was as follows:—

<i>Class</i>	<i>No. at beginning of Term</i>	<i>No. Left</i>	<i>Number at end of the Term</i>
A.A.S.	16	—	16
2nd Year A.As	26	1	25
1st Year A.As.	46	—	46
N.A. Junior Course	26	—	26
	114	1	113

The distribution by area of origin is as follows:—

<i>Province</i>	1958 <i>A.A.S.</i>	1957 <i>A.A.</i> <i>Govt. N.A.</i>	1958 <i>A.A.</i> <i>Govt. N.A.</i>	1958 <i>N.A.</i> <i>Junior</i>	<i>Total</i>		
Adamawa	—	—	1	1	4	6	
Bauchi	—	—	3	—	2	5	
Benue	1	—	3	2	3	9	
Bornu	—	—	2	—	4	6	
Ilorin	—	2	1	5	1	—	9
Kabba	3	5	—	7	—	3	18
Kano	—	—	—	—	—	—	—
Katsina	—	1	—	6	—	—	7
Niger	—	8	1	5	—	3	17
Plateau	—	—	1	1	—	3	5
Sokoto	—	3	—	7	—	—	10
Zaria	—	—	—	2	—	4	6
Eastern Region	9	1	—	—	—	—	10
Western Region	3	2	—	—	—	—	5
	16	25	46	26	113		

This is the greatest number of students the School has ever had but problems of accommodating them have been solved.

The students shown as of non-Northern origin are on permanent establishment and have been in the Department for some year.

The A.A.S. course consisted of very experienced assistants indeed who had spent an average of over 12 years working in the field after their first courses in School of agriculture. It was a great help to have these and the meritorious Agriculture Instructors, who also are more mature and experienced, in the student body.

SPEECH DAY

This was a memorable day for the students as apart from the Minister of Agriculture, who presented the prizes, nine other Ministers and the Emir of Zaria attended.

LIBRARY

Some 200 new books were received bringing the stock to 2,512. The library was much used by staff and students. Classification and cataloguing with the help of the Regional Research Station Librarian was very nearly completed.

TEACHING

Apart from School staff, lectures, and demonstrations were organised by the following:—

Mr Benton	Botany Department, R.R.S. ...	Horticulture
Mr Jesson	Regional Research Station ...	Apiculture
Mr Clayton... ..	Soil Survey Department ...	Ecology
	R.R.S.	

Mr Hope	...	...	Soil Survey Department,	...	Geology
			R.R.S.		
Mr Haris	...	...	Veterinary Department	...	Veterinary Work
Mr Rains	...	...	Shika	...	Grassland
Mr Bowers	...	...	Agricultural Engineering Branch		Mechanisation
Mr Obi	...	...	Regional Research Station	...	Statistics

These were greatly appreciated as was the help received from other specialist officers who gave their time freely when students were taken round their sections. The Samaru School is extremely fortunate in being able to ask for such assistance and in having close at hand so many diverse subjects for practical demonstrations to students.

COMPETITIONS

Practical competitions between students were organised in milking, ploughing, cattle judging and tractor-driving and were instructive and enjoyable. There was also a Horticultural Show of student's products which officers of the Regional Research Station helped to judge.

FRIDAY NIGHT CLUB

Films were shown on alternate Fridays throughout the year and on the other Fridays the Club organised an attractive and varied programme of talks, discussion, brains trusts and debates.

ATHLETICS

Apart from Zaria League matches there were inter-house soccer matches for the "Gibbon" Cup and a number of friendly matches. Hockey matches were organised, boxing appealed to a few of the students, who received weekly lessons and Table Tennis was as popular as ever.

HOSTEL IMPROVEMENTS

These included planting of hedges and bushes and shrubs levelling and rolling much of the area and greatly improving the roads and drainage.

THE MAIN FARM AND TRAINING FARMS

These functioned well and students gained experience in all aspects of practical farm work on them, and in managing livestock, field trials and machinery and implements. (Block Forms are appended).

Yields were fair, samples being as follows:—

Hay (various types)	...	...	...	1½–2 tons per acre.
Groundnuts	...	...	...	522–903 lb shelled nuts per acre.
Cotton	...	...	...	90–556 lb per acre (lower figure on a water-logged site).
Guinea Corn	...	...	...	470–600 lb per acre—stem borer attack was severe.

In addition, three trials were carried out, a groundnut Variety trial, N and P on rice and a cotton time of planting and phosphate trial.

CATTLE

	<i>Bulls and Bullocks</i>	<i>Cows</i>	<i>Young Bulls</i>	<i>Heifers</i>	<i>Bull Calves</i>	<i>Heifer Calves</i>	<i>Total</i>
Stock on hand at 1/4/57 ...	22	17	7	14	8	8	76
Births 1/4/57-31/3/58 ...	—	—	—	—	11	3	14
Transfer in 1/4/57-31/3/58	7	5	4	7	—	—	23
Total ...	29	22	11	21	19	11	113
Deaths 1/4/57-31/3/58 ...	—	—	—	—	—	—	—
Transfer out 1/4/57- 31/3/58 ...	10	2	11	15	6	8	52
Stock on hand at 31/3/58	19	20	—	6	13	3	61

Transfers out: Reasons were, apart from internal transfers because of increased age:—

Broken leg—1

Transferred to Agronomist—14

Sold because old or surplus to requirements—13

There were two abortions, probably due to ergot poisoning.

A new stock bull was obtained from Shika.

GOATS

	<i>Billies</i>	<i>Nannies</i>	<i>Does</i>	<i>Billy Kids</i>	<i>Nanny Kids</i>	<i>Total</i>
On hand 1/4/57 ...	2	6	3	3	3	17
Births ...	—	—	—	9	7	16
Transfers in ...	2	6	—	—	—	8
Total ...	4	12	3	12	10	41
Deaths ...	—	—	3	1	1	5
Transfers out and sales ...	2	3	—	10	4	19
On hand 31-3-58 ...	2	9	—	1	5	17

Surplus stock were culled to keep the numbers manageable.

PIGS

	<i>Boars</i>	<i>Sows</i>	<i>Gilts</i>	<i>Fatteners</i>	<i>Piglets</i>	<i>Total</i>
On hand 1-4-57 ...	2	5	2	23	5	37
Births ...	—	—	—	—	95	95
Transfers in ...	—	4	3	44	—	51
Total ...	2	9	5	67	100	183
Deaths ...	1	2	—	1	25	29
Transfers out and Sales ...	—	2	5	43	44	94
On hand 31-3-58 ...	1	5	—	23	31	60

CAUSES OF DEATH

Suspected Anthrax—1 (not confirmed)

Trypanosomiasis—3

Crushed by mother—3

Weak and died soon after birth—22

All the pigs received Antrycide inoculation immediately after this unsuspected outbreak.

The large number dying soon after birth arises from two litters. One litter of nine died completely—there were pink, hairless and weak. Of a litter of eleven weak pigs all but two died and these were reared by hand as the mother was milkless. The basic cause was probably genetic and the sows producing these litters were culled. A young boar was used and the introduction of fish meal seemed to do a lot of good, and the end of the year saw a great improvement in health and two young sows rearing ten piglets each very satisfactorily.

POULTRY

These presented a sorry picture although numbers were nearly maintained.

								<i>Stock at</i> 1-4-57	<i>Stock at</i> 31-3-58
Fowls	...	...	...	...	...	...	...	62	55
Ducks	...	...	...	...	...	...	...	45	31
Total ...								107	86

Apart from known causes of death—tuberculosis—1, Intestinal worms—4, Coccidiosis (known and suspected)—14 and snake bite—2—some sixty died of unknown causes and most of these were sent to Veterinary Officer, Zaria or the Poultry Research Station at Kaduna. Many were weakened by fowl pox following fowl pox vaccination but this was successfully treated with iodine.

All the stock received vaccination as recommended, Nefco and Tenaban tablets were given at regular intervals, potassium permanganate was added to all drinking water, all except the very youngest were regularly D.D.T. dusted and at the end of the year sulphamezathine was added to drinking water as a prophylaxis against coccidiois. In addition penicillin was added to all poultry food and after trials had showed their value fish meal or fish solubles were added to their food.

There was a distinct improvement in the appearance of the birds towards the end of the year.

Egg production was 2,318 from the hens and 450 from the ducks—a total of 2,768.

Incubation results were exceptionally poor. The conclusion was that this was almost entirely due to the "Glevum" incubators which have apparently a most inefficient temperature control, at least for use in our temperatures.

On one occasion an incubator got so hot that the thermometer burst

GARDENS AND IRRIGATED AREA

These were fully utilised and the irrigation system worked well, rice in the wet season and vegetables in the dry season being grown on the same land. The nursery offered all necessary facilities for the teaching of budding, grafting and fruit-trees care and the "living museum" of all Crops grown in Northern Nigeria was an aid to teaching.

Part IV.—Agricultural Training and Education Division

1. This division was established in November, 1957 and for the year under review most of its activities were concerned with the School of Agriculture, Samaru and the proposed new School at Kabba. The activities of the School of Agriculture at Samaru have already been reported under Part III.

SCHOOL OF AGRICULTURE, KABBA

The School site was inspected by the Regional Architect and members of the staff of this Ministry in November in order to fix the positions of the main buildings for the new School.

Arrangements were made for the building of two staff houses to begin immediately so that a member of the School staff could live on the spot and supervise layout and development of the farms whilst the building of the school was going on, in order that buildings and farms might be ready for occupation at the same time. The second of the two houses is intended in the first place for a member of Public Works Department staff to supervise building.

By the end of March clearing of the land preparatory to building the houses had begun, although of course detailed plans for the school proper were still in the drawing board stage.

SHORT COURSES

Thirty-one temporary Agricultural Instructors recruited to the department were given a month's training by staff of the Training and Education Division in Kaduna in March, 1958. Eight of them were found to be unsuitable and their appointments terminated. The twenty-three others completed the course and were posted to agricultural stations.

YOUNG FARMERS CLUB

The Secretary, Training and Education attended the first Annual General Meeting of the Northern Regional Federation of Young Farmers Club held at Bauchi in March, 1958 and will act as the Ministry's representative to this organisation.

LIAISON WORK

Considerable liaison work with the Ministry of Education and particularly the Scholarship Board was carried out by the Division.

GENERAL

As the Division is entirely new, organisation of it has only just begun and work is still in the initial stages. Much time had of necessity to be spent in gathering together threads scattered through the other divisions, for instance correlating the various short training courses that some of these divisions had already organised, and a start made on preparing comprehensive schemes of training for all grades within the Ministry.

Part V.—Irrigation Division

GENERAL

(1) The activities of the Irrigation Division continued at the same tempo of the previous years with the higher construction activities concentrated in the Bida and Pategi areas. Evidence of the general determination to find areas suitable for irrigation began to be forthcoming in the drier areas of the north such as Sokoto, Kano and Maiduguri.

(2) In the Sokoto area the design for the Wurno scheme was completed and approval given to commence construction. Work was well under way by the end of the year. The year also saw the virtual completion of two small irrigation schemes in the Kano area, one, a gravity scheme of fifty acres at River Tomas and the other, a windmill-operated, pumping scheme at Makoda Lake.

(3) In Bornu, however, owing to shortage of staff the activities of the Irrigation Division came to a virtual standstill. Late in the year an engineer became available, although young and inexperienced, and he was posted to Maiduguri with instructions to tour Bornu and report on the prospects of finding suitable schemes for construction. This was a difficult task and only one small scheme was put forward for a windmill-operated pump for an area boarding Lake Alau of some ten to fifteen acres. The engineer in question was due for leave in April and duly left.

(4) Throughout the year there was a growing realisation that the method of approach to irrigation was in need of reconsideration. The dry areas of the north produced insufficient rainfall and runoff to allow immediate search for suitable schemes to be successful. It became obvious that the only approach remaining open was to make a detailed survey of the water resources of the areas by the establishment of a full hydrological coverage.

(5) A step in that direction was taken in the Sokoto area where stick gauges and raingauges were installed and supervised to ensure that the data was collected. A little progress was made in this direction in the Kano and Bornu areas but staff shortages severely restricted progress.

(6) The staff shortages and limitations on available funds soon brought about the realisation that a separate section of fully trained hydrological engineers with adequate instruments and funds, and backed by a computing filing system would be necessary if progress in this direction was to be achieved. The year closed with the submission to Government of a proposal to create such a section.

(7) Parallel with this change of approach to the measuring of the water resources available there developed also a change in the ultimate objective of the Division. The vast areas of the Sokoto fadama and the firki soils of Bornu suffered in the wet season from serious flooding but for the remainder of the year experienced continuous drought. In neither case, however, was the water table very far below ground. In the Sokoto fadama the water table was fed by percolation of the dry weather flows just below the fadama and in the firki soils of Bornu the vast reservoir of Lake Chad lay comparatively close at hand.

(8) The conception of confining the Sokoto river between levees at or less than 2,200 feet to protect the fadama averaging three and a half miles wide from flooding was a natural outcome. The irrigation of the protected fadama by gravity through the levees, supplemented by small pumping units where necessary follows naturally. The much longer project of diversion weirs and impounding dams to utilise and extend the rains of the wet season seemed worth investigation.

(9) This development in irrigation thought was encouraged by the fact that such vast projects could not be financed internally and international finance would be necessary. The completed design would thus have to stand the scrutiny of the world's experts on irrigation and thus the need for a sound hydrological basis for the scheme.

(10) Similar developments in Bornu were only in the formative stage at the close of the year.

(11) Kano area has seen the construction of two small schemes, but difficulty has been experienced in finding other small schemes of a similar nature. While the search continues the problem of hydrological data was under consideration by the end of the year.

STAFF AND ADMINISTRATION

(1) Towards the end of the year the establishment of the Division was increased to sixteen Senior Officers. The total occupancy of duty posts did not at any time of the year exceed ten. All but two of these ten officers were on contract. Only one officer was recruited during the year on transfer from the home civil service. Two of the longer service officers, although of long and varied experience, were over age and their future length of service must of necessity be comparatively short.

(2) A very high turnover of officers in previous years, while not being actually experienced in the current year, remained a threat to the Division's activities owing to the high proportion of contract officers.

(3) The position in regard to senior staff must be considered as unsatisfactory. As a result of an appraisal of the situation it was decided to try and recruit an officer in the middle forties in order to provide a degree of continuity in the most senior post of the division, the Secretary for Irrigation. An officer of satisfactory age and experience was recruited and took up his appointment at the end of the year.

4. The introduction of the appointment of Assistant Technical Officers in training and the creation of a training course in the Technical Institute and Training Centre laid the foundation for the eventual creation of a well trained senior subordinate technical staff. Three officers of the Irrigation Surveyor grade were selected for the training course and duly entered the Institute. An advertisement calling for application for direct entry as Assistant Technical Officers in training resulted in six suitable applications being received. It does seem, therefore, that the Division will in three years time have a good intake of senior subordinate trained staff and a constant flow of new blood each year.

5. In the junior ranks of Irrigation Surveyor and Irrigation Overseer the position was not nearly so satisfactory owing to the cancellation of a training course which had been arranged for direct intakes of these grades of officers enforced by the lack of training staff. Officers taken on the staff with a view to sending them to this course were retained by the provincial offices of the Division and given some training in the field. Their retention in the Division was authorised in the hope that the staffing position in the Institute would improve sufficiently to permit the course to be started. This hope had not materialised by the years end.

6. Little or no building was undertaken but in order to operate and maintain the machinery on the construction of the Wurno Irrigation Scheme a workshop and store were built near the site and a Rest House and general store on the hill over-looking the fadama were also started.

ACTIVITIES IN THE PROVINCES

SOKOTO PROVINCE

1. The gauging programme was extended to cover the main rivers of Sokoto Province and forty-five gauges were installed and were being read throughout the year. A new current meter arrived late in the year and a few readings were taken in the Rima at Sokoto. In the field of rainfall recordings the Division inspected all sites that were furnished with gauges and tried to encourage the readers responsible to take accurate and consistent readings but with little success. Preparations for the Division to take a more active part in the installation, maintenance, reading and collection of the data were made.

2. The Kwarre Irrigation scheme was surveyed during the year and plotted. This is the first accurate survey of the existing scheme since its construction showing the irrigation canals and the drainage channels. Owing to lack of staff this plan has not been traced or printed as yet.

3. An area below the existing scheme was selected for investigating the possibility of providing irrigation facilities during the dry weather, using the surplus water in the stream that irrigates Kwarre. The survey was started in December and by the end of April plotting was in progress. A small survey was started to investigate the possibility of providing a supply to the orchard at Kwarre from the same source. This proved to be possible and the small irrigation canal was constructed with immediate improvement in the orchard.

4. In co-operation with the Field Services a survey of the contours of the Birnin Kebbi fadama was made at Zauro, in connection with their rice experiments. The survey was started in February and was continuing at the close of the year.

5. The Wurno survey was completed and plotted and the lines for the main bund and the main drain selected, surveyed and plotted. Construction work commenced in January using two D.4s and one scraper. The rate of construction was to be accelerated with the arrival of a new D.6 and scraper but this machine had not started work by the end of the year. Of the total length of 30,100 feet of the main bund, 4,100 feet had been completed by the end of the year. The whole of the Tutudawa main canal and 8,600 feet of the Lugu main canal were completed together with 7,000 feet of the main drain.

6. In order to prevent breaching of the main bund in the Gummi scheme a two hundred and fifty foot spillway was cut in the embankment and the bund was made up to design level and grassed. Repairs were also carried out at Bukwium and Farfajia. The irrigation channel at Gwotomo was repaired and water supplied to the Field Services Experimental area. Two sluices were cut in the surplus weir at Guzan and a layer of stones was placed on the inside of the bund to reduce erosion by wave action. Assistance was accorded the Veterinary Department and the Sokoto Native Authority in the design of two cattle dams.

NIGER PROVINCE

7. The Tungun Kawo Drainage and Irrigation scheme is situated in an inland fadama between Tungan Kawo and Bakoji in Wushishi Emirate. It is a very fertile fadama of three and a half square miles already in use for growing rice. The Field Services Division has for several years mechanically ploughed an increasingly large acreage for the farmers on payment. The area suffers from flooding which damages the rice and reduces the yield.

8. The objective of the scheme now under investigation is to prevent this flooding and supply water to about 1,600 acres of the area. It may become possible to increase this area in the future. The method to control the flooding consists of preventing the entry of the water to the fadama by the construction of a dam at its upper end and improving the drainage of the area by deepening and widening the two streams that traverse the area. An irrigation channel down the centre of the area will be provided to distribute the supply from the dam.

9. The Wushishi Native Authority has agreed to the declaration of the area as a Settlement Area and for the framing of Irrigation Rules along lines similar to the Bida Native Authority Schemes. Work started in December, but progress was slow owing to the lack of sufficient engineers. Only one engineer was available for this work. However, by the end of the year six hundred feet of the dam had been constructed, the dam site cleared and the materials for the structure assembled. Two dragline excavators had been transferred to the area and assembled and will undertake the improvement of the drainage channels. Excavation for the large drainage sluice through the dam was in progress at the end of the year.

10. The Guzan Irrigation Scheme situated in the fadama of the left bank of the Niger in the Kutugi District of Bida Division was under investigation during the year. The object of the scheme is to provide irrigation facilities for rice growing for about 1,500 acres of land above flood level by the construction of a diversion weir and sluice on the perennial Yiko River and a distribution system.

11. No work on the actual scheme has been done but the entrance road was constructed and three fourteen foot bridges constructed on it.

12. The Bokoji Irrigation Scheme situated in the fadama at the Gbako-Niger confluence is nine miles long running parallel to the Minna-Baro railway line and varies in width from two miles to one half a mile. part of the area is already used by the farmers for growing rice, irrigating it themselves mainly from the Emoko stream which crosses the fadama midway along its length. The scheme is still under investigation although 7,000 acres of the total area of 8,000 acres have been contoured and hydrological data have been collected.

13. The objective of the investigation is to ascertain the possibility of constructing headworks on the Bakoji River and take a main canal along the length of the area parallel to the railway line. A distribution and drainage system would be needed. It is expected that the surveys and investigations will be complete about April 1958.

14. The Wuya-Edozhigi Irrigation Scheme underwent development and improvement during the year. The main structures consisting of the flood protection bund, diversion weirs, main and distribution canals together with necessary structures had been completed in the previous year. During the current year distributary E.1 was extended by about a mile and a new channel was constructed at the end of K.1. A new drain was constructed at the southern end of the area inside the flood protection bund, and a new channel completed to bypass the porous length of canal between K.3 and R.2.

15. At the beginning of the season the maintenance and administration of the scheme was headed over to the Bida Native Authority under the technical supervision of the Irrigation Engineer.

16. On the 24th September the Kaduna flood reached a peak of 239.1 at the ferry, the highest recorded since the scheme was constructed. The flood reached within one foot of the top of the bund in places but was not

overtopped. Flood water did enter the area from the left bank by crossing the road and the Kupanko Diversion Channel. To prevent a recurrence of this flooding a bund is being constructed along that channel.

17. The narrow limits of freeboard during this flood were considered inadequate and work to restore the margin to three feet started on the 26th of March. The floods drowned some of the rice in lowlying areas but after they had receded the areas were replanted and supplied with water up till the end of February and a good crop obtained. An irrigation rate was collected over 1,164 acres this year an increase of 140 acres over the previous year.

18. The construction of the Badeggi Irrigation Scheme was completed during the previous year and work in the current year consisted of development and improvement of the distribution of the supply. Several small structures were put in on D.2 and D.6 and two small field channels were added to D.8. The Gbako river caused some breaches during the wet season but these have been repaired.

19. The Bida Native Authority, as at Edozhigi, took over the administration and maintenance of the scheme. The area from which a water rate was collected increased from 618 acres last year to 900 acres this year.

20. The work on the construction of the Loguma Irrigation Scheme continued throughout the year. This scheme is intended to provide irrigation to four hundred acres of fadama on the left bank of the Niger alongside the Minna-Baro railway line three miles East of Katcha. The headworks situated on the Emi Stream above the railway line was completed and the main canal excavated passing under the railway line in a culvert constructed by the Nigerian Railway Corporation. The main canal was carried under the road by a concrete culvert and provision to deal with the cross drainage made by the construction of a concrete flume. The distribution system was partially complete by the end of the year.

(21) The fadama consists of an area of land above the Niger flood level which is planted early, and a large area below maximum flood level which is planted below the receding flood. The later area requires irrigation water until the end of March. The irrigation system already installed was in operation this season and all land taken up received an adequate supply.

(22) At a meeting called by the Senior District Officer, Bida at Loguma in October it was decided to declare the scheme a settlement area and steps are being taken to accomplish this.

(23) Rainfall gauges were maintained at seven stations and daily stick gauge readings were taken at twenty-four sites in the province. Current meter gaugings were taken on eleven water courses.

KANO PROVINCE

(24) A preliminary survey of four hundred acres of land in the valley of the Tomas River was carried out during the year and it was found that 100 acres of this land would be suitable for irrigation fed by gravity from headworks constructed just below the main road. A small concrete weir

drops planks to raise the water level was constructed and a main canal 7,500 feet long was completed on one flank of the river. The channel was designed to take two cusecs. Water was first passed down the canal in December but little enthusiasm was shown by the local farmers. The Field Services Division took over four acres of the land and carried out experimental and demonstration work on rice, wheat and vegetables.

(25) A windmill scheme was investigated at Makoda Lake with a view to installing a wind operated pump to provide irrigation for the growing of dry season vegetables. An eighteen foot windmill on a sixty foot tower was erected near the lake and an intake channel constructed from the lake to the sump of the pump. Two irrigation canals were constructed to feed two areas of eight and twelve acres each which were divided into half acre plots for allocation to farmers. The scheme is an experimental venture and its success or otherwise must await two seasons operation. Until the results of this scheme are available it is proposed to postpone the construction of similar schemes.

26. A survey of an area of 780 acres subject to flooding by the Jakara River at Sugungun was undertaken and nearly completed by the end of the year. A survey of the Hargo river area was undertaken with a view to investigating an irrigation scheme for some fifty acres. The scheme was abandoned when the local farmers stated that they wanted the land for grazing. Levels covering eight miles of the Gembe river, a tributary of the Tomas River, were completed with a view to providing some fifty acres with irrigation. As the prospects of success did not appear very good nothing further has been done on the project.

ILORIN PROVINCE

27. At Lade the extension of the survey on the Duku Scheme was completed at the end of 1957 and a decision to make a more detailed survey was agreed to and the work put in hand. Approval to start construction work was given in April 1957 and by the end of the year the headworks was nearing completion. Construction of the first six thousand feet of the main canal was also completed. As the engineer in charge was going on leave in mid April and as there was no other engineer available it was decided to close the work down at the end of March and await the arrival of another engineer before completing the work.

28. The Bacita area had been selected as a possible site for large scale sugar growing. A preliminary survey of the area was undertaken by the Irrigation Division with a view to ascertaining roughly what proportion of the land was suitable for sugar growing. Owing to other commitments the Irrigation Division was not able to continue with the survey work which was taken over by the Provincial Surveyor.

29. The reading of stock gauges and the taking of current meter gaugings were continued throughout the year on those streams flowing into the Niger in which the Division took an interest. This data is required in respect of future irrigation schemes.

BORNU PROVINCE

30. During the first four months of the year there was no Engineer stationed in the province and the work of the Division virtually came to a stand-still. The plant and machinery were looked after by the Mechanical Demonstrator who handed over to an Engineer in July and proceeded on leave. The Engineer was instructed to tour the province with a view to assessing the likelihood of finding small irrigation schemes for early construction.

31. As a result of this investigation a survey was carried out on the shores of Lake Alau and an area of twenty acres selected as a possible site for a windmill operated pump. The plotting of the survey was completed by the end of the year.

32. The inspection of the River Yobe from Gashua to Lake Chad indicated that the fadama of that river would repay closer investigation. Gauges were established at Geidam and re-established at Gashua. A longitudinal section of fifteen miles of the river above and below Gashua was surveyed together with four cross sections of the fadama.

33. The Ibeji River was inspected between Jilbe and Lake Chad and seemed to offer some prospect of providing irrigation by pumping. A gauge was established at Gambaru and read for the rest of the year. Gauges were also established on the Yedseram and Ngadda at Bama and Maiduguri respectively.

34. The stores and plant kept at Lake Chad were transferred to Maiduguri after the decision to close down on Wulgo was made and the house handed over to the Resident to use as a Rest House.

CONCLUSION

The activities of the Division continued throughout the year at a fairly high rate in Bida, Sokoto and Pategi areas, but elsewhere little progress was made. Even in these areas a general slowing down of activity was enforced owing to the eligibility of leave of all the junior engineers in the last few days of March and early April. Only one recruit was obtained during the year and the best that can be said of the position was that the outlook was gloomy. The intensification of recruitment and the institution of a hydrological section to the Division appeared the only means of broadening and developing the activities of the Division.

Part VI A.—Research and Specialist Services Division—Summary
GENERAL REVIEW OF THE YEAR

1. The research report of this Division will be published separately as Part II: Record of Investigations, and should be referred to for details of the work outlined below.

2. A highlight of the year was Samaru's first experience of being host to an international conference, albeit only a small one. This was the West African Cotton Research Conference, the third of a series of informal

African specialist conferences devoted to specific crops which have been jointly sponsored by the British and French Governments since 1953. The conference, which took place between the 18th and the 23rd November, 1957, was attended by thirty delegates of whom there were from the Belgian Congo (one), the Federation of Nigeria (two, including one from University College, Ibadan), France (one), French Equatorial Africa (seven), French West Africa (three), Ghana (one), Northern Region of Nigeria (ten), Portuguese West Africa (one), Tanganyika (one), Uganda (two) and the West African International Secretariat (one).

3. The conference was opened by the Minister of Agriculture, Northern Region. Thirty-two papers were presented and discussed, and various field and laboratory sessions were held in the afternoons. A great deal of useful exchange of information took place, and the conference was generally agreed to have been most successful.

4. A welcome visitor to Samaru during October, 1957, was Mr G. W. Nye, C.M.G., O.B.E., Agricultural Adviser to the Colonial Office, who spent four days in inspection and discussion of the work of the research sections, and made many valuable suggestions and criticisms. Mr Nye's previous visit was in 1952.

STAFF AND ADMINISTRATION

1. The reorganisation of the Ministry on integration resulted in the transfer to this Division, largely for reasons of administrative convenience, of responsibility for agricultural engineering, soil conservation and land use, fisheries and apiculture. All these subjects at the present time involve much more extension work than investigational work, and it has become clear that the first two, with their widespread field activities, are difficult to operate efficiently under this Division, and the general opinion is that they will have to be transferred back to the Field Services Division. The much smaller commitments of apiculture and fisheries present no such administrative problem, and there is at present no intention similarly to transfer them.

2. A particular point of interest in the organisation of the Division is its liaison with the extension services of the Field Services Division. Each provincial establishment has an Agricultural Officer (Investigations) whose function is to supervise the experimental work in the province, (the vast bulk of which emanates from the specialist officers of the Research Division), to maintain contact with research progress and to keep the Principal Agricultural Officer of his province informed. It is believed that by this means much closer co-operation is maintained than would be the case if the Agricultural Officer (Investigations) were a member of the Research Division.

3. The senior staff position improved further during the year through the arrival of eight Botanists and Plant Pathologists, two Entomologists, two Soil Survey Officers, one Chemist and one Stores Officer. Four officers were lost to us, three by resignation. The death is deeply regretted of Mr H. M. Parker, Empire Cotton Growing Corporation Plant Pathologist, during his second tour of duty.

4. The subordinate staff position continued to deteriorate though slightly. Only in the lowest grades with barely adequate educational qualifications was any improvement shown.

5. *Buildings*.—Seventeen Senior Service quarters and one block of six flats were completed at Samaru and Shika. This included two for the Federal Government. Ninety eight Junior Service quarters were also completed as were forty-two labourers' houses at Samaru and a garage and workshop at Shika.

WORK OF THE DIVISION

In conclusion, the year may be summarised as one of considerable progress in the building up of the research organisation and in the lines of investigation, and also one of not a little frustration particularly on account of the slow progress of the building programme: the ever increasing scientific staff is working in more and more cramped conditions, and under these conditions they cannot give of their best.

GUINEACORN

As with other cereals, improvement is at present hindered by insufficient knowledge of the potentialities of the indigenous material and the factors limiting yield. Work has started on a sorghum survey of the Region to collect some of this necessary information.

Twenty-five trials of indigenous varieties have confirmed the pattern of previous years' results. Three types have shown promise over large areas. Farfara yields well in most areas from Samaru southwards, especially at Yandev where it heavily outyields the local variety. Yar Gunki is suited to the Kano, Kafinsoli, Gusau zone. Kaura does well in most of the Region except the arid Sudan zone. An improvement programme is in operation for these varieties. Shambul yields well in the Sudan zone but its edible qualities are not popular. Improvement work on this variety has been suspended as an introduction from French country shows promise in this area.

Thirteen fertiliser trials on guineacorn were carried out; results of ten trials over four years in Lowland Division showed that application of superphosphate would produce only very small cash profits. Similar results were obtained in Southern Division and at Lapai; in none of these areas did application of sulphate of ammonia produce an economic increase in yield. Optimal dressings of superphosphate appeared to be between 30 to 40 lbs per acre.

A fertiliser trial on masakwa at Yola gave very marked increases in yield from sulphate of ammonia.

The permanent D.N.P.K. trials showed increases in yield from F.Y.M., superphosphate and sulphate of ammonia; there was no response to muriate of potash.

A mulching trial at Samaru showed that groundnut shell and grass mulch were superior to no mulch or chopped guineacorn stalks. Groundnut shell mulch increased the response of guineacorn to fertiliser applications.

Seed dressing trials have shown that suitable dressings improve germination and establishment. The effect on yield may be nil when the planting rains are good, but when they are bad the effect is sometimes dramatic. Bird resistant guineacorns were introduced from Texas and Rhodesia. But previous experience indicates that resistance vanished if the birds have no other preferable variety on which to feed.

MILLET

The main millet programme has been transferred to the Sudan zone sub-station at Katsina. This will facilitate a more intensive study of the crop.

By a top cross hybrid procedure an increase of yield of the order of 10 per cent has been achieved in preliminary experiments.

A similar survey to that for guineacorn has been undertaken.

The effects of seed dressing millet are the same as those already described for guineacorn.

MAIZE

The co-operative scheme for multiplying Mexican type maize bred by West African Maize Research Unit has been successful. Breeding of early maturing varieties for more northern conditions is continuing in co-operation with West African Maize Research Unit. In a variety trial at Samaru ten introduced varieties heavily outyielded Bomo local. They averaged 3,503 lb of grain per acre as compared with 1,814 for local. The highest yielder was Mexico 5 which gave 4,335 lb per acre.

The large series of fertiliser trials on maize interplanted with guineacorn continued in Ilorin Province; results from Oke-Ode show consistent responses of maize to sulphate of ammonia and occasional responses to superphosphate; occasional residual effects of superphosphate on the later planted guineacorn were obtained.

Two fertiliser trials in Kabba Province with the local maize and Mexico I showed responses to both sulphate of ammonia and superphosphate.

RICE

Swamp rice improvement is being continued in collaboration with the Federal Botanist at Badeggi. Varieties suitable for shallow water and controlled water conditions have been widely distributed. The search for a variety of *sativa* to replace the *glaberrima* rices grown under the deep and uncontrolled water conditions of the Sokoto swamps is still in progress.

Trials with upland rice have proved so successful that the demand for seed now far exceeds the supply. A multiplication scheme is being initiated.

A preliminary trial on the control of weeds in rice using 2-4 D gave promising results.

Eight fertiliser trials on rice were carried out throughout the Region, but only three produced significant results; two showed responses to both sulphate of ammonia and superphosphate and one to superphosphate only.

Five trials comparing transplanting and direct seeding of rice gave rather variable results depending on the degree of water control available.

COWPEAS

The search for a palatable high yielding variety of cowpea continues. One hundred strains were tried at Samaru during the year but the highest yielder, New Era, gave only 322 lbs per acre. This variety is unpopular for eating but is being used for hybridisation. Four white-seeded varieties from Ghana outyielded all the local white varieties but the best gave only 200 lbs per acre. In planting sequence trials at Kafinsoli and Kano small plots gave yields of over 600 and 700 lbs per acre.

Certain varieties have been shown to be extremely sensitive to day length which makes their time of planting very important.

Four spacing trials were carried out at Yandev, Daura, Katsina and Kontagora. Only at Daura did spacing produce a significant effect on yield, 3ft x 3ft being better than 6ft x 6ft.

CASSAVA

The variety CH. 50 proved the heaviest yielder in the Zaria area and is being multiplied for distribution.

Following the observation that the popular variety Dan Warri gave equal yields from clean and from mosaic infected stock two other varieties, Doneji and Gamagari were similarly tested. With these, however, mosaic infection depressed yield by 50 per cent. Testing further material, in co-operation with the Federal Ministry, continues.

Fertiliser and manurial trials were continued at Kano, Yandev and Ilorin; to date the only responses have been to sulphate of ammonia. The permanent D.N.P.K. trial at Bida in two years has shown responses to sulphate of ammonia; in one year there was a response to superphosphate, F.Y.M., and muriate of potash produced no effects.

YAMS

Yam collections have been started at several stations in the Middle Belt.

Twelve fertiliser trials on yams were carried out in various parts of this area. Results showed consistent responses to sulphate of ammonia although at Paiye, Oke-Ode and Riyom responses to superphosphate were also obtained.

The permanent D.N.P.K. trial at Yandev showed responses to F.Y.M., sulphate of ammonia and superphosphate. Muriate of potash either reduced yield or had no effect.

SWEET POTATOES

A small amount of true seed was collected and grown to develop techniques for selection from seed. The result was very successful. The search is for a heavy-yielding white starchy variety of the type already popular in the country; and for a heavy-yielding yellow sweet variety not generally known here but of high nutritive value and good eating-quality.

SUGAR CANE

Eleven introduced varieties of sugar cane were multiplied for large scale tests. The introduced hard canes are unpopular for chewing but are steadily spreading because of their resistance to red rot disease, much heavier yields and their ability to ratoon.

EUROPEAN VEGETABLES

Firm recommendations can now be made on varieties of vegetables suitable for growing in the Region but the search for still better strains continues.

A series of fertiliser trials at Samaru on cabbage, carrots and tomatoes was concluded. These show that the optimum rate of application of sulphate of ammonia to all three is around 2 to 3 cwts. per acre. The optimum rate of superphosphate is 3 to 4 cwts., on the first two and up to 6 cwts., per acre on tomatoes.

Eelworms have been found to damage a wider range of crops than was supposed. Its control by the soil fumigant "D.D." doubled tomato yields on infected land.

NATIVE VEGETABLES

A large collection of these has been made but it is impossible to treat them all adequately at present. Improvement work is confined to onions and okra.

A trial at Bussa comparing fertilisers and compost on onions showed that higher yields were obtained by using both fertilisers and compost rather than either alone.

TREE CROPS

Citrus root stock trials are being established in most provinces. Investigations into mango root stocks have been initiated at Samaru as there seems to be incompatibility between the Julie variety and some of the local "bush" mangoes. Work continues on the improvement of nursery technique.

Kola has been established at a series of heights above the water table of a fadama at Samaru. Less than 10 per cent of the plants have been lost but no prediction as to ultimate success can be made at present.

A main centre for tree crop investigations has been opened at Kabba. Sites have been prepared and nursery material is being propagated for cocoa and coffee establishment trials.

Observations were made on the relationship between ants and the soft scale of citrus *Coccus hesperidum* L. The most common ant in the association at Samaru is the arboreal *Oecophylla longinoda*, Latar., which lives in colonies extending over as many as twenty-five trees, each tree containing up to fifty nests.

All the nests examined contained the scale and the degree of parasitism on scales inside the nests was considerably lower than that outside. The

numbers of scales within a nest could be reduced by preventing the access of ants to that nest. There was some suggestion that the ants assisted in the spread of the scales.

A foliage spray of 1.5 per cent dieldrin kept trees completely free of ants and scales for sixteen weeks. This spray was superior to 4 per cent D.D.T., or 1 per cent *gamma* B.H.C. Neither 1.5 per cent dieldrin or 4 per cent D.D.T., were successful when used as a trunk spray against *Oecophylla*, but the former insecticide was effective in keeping seedlings free of scales tended by a ground-living ant *Crematogaster*; sp.

Observations were also made on *Papilio demodocus* Esp., the defoliating larva of which can be controlled by hand-picking, and on *Argyroploce leucotreta*, Meyr., which causes fruit-fall, and which can be controlled to some extent by orchard sanitation.

GROUNDNUTS

Twenty-three variety trials were carried out. The present position is as follows. In the dry twenty to twenty-eight inch rainfall belt along the northern border no variety superior to the local spreading has yet been found, though some recent importations from across the border show promise. Further south, in the Kano type of climate, Kano 50 is superior to local varieties. Further south in the Samaru belt the variety Samaru 38 is best. In Benue Province Spanish 205 is the heaviest yielder but matures during the rains. In Azare a newly developed variety, Samaru 57, has yielded well and is being distributed to farmers at their own request. At Mokwa the imported variety Mwitunde yields well and has the additional advantage, in this rosette ridden area, of being fairly resistant to the disease when grown on a large scale.

Twelve fertiliser trials were carried out; in six of these trials responses to sulphate of ammonia were obtained as well as to superphosphate. At Langtang in Lowland Division, application of either 40 lbs., of sulphate of ammonia or 40 lbs., of superphosphate would produce economic increases in yield.

A trial at Samaru showed that application of superphosphate in the furrow before splitting ridges produced the same effect on yield of groundnuts as placement of the same quantity of superphosphate near the seed at planting time.

The permanent D.N.P.K., trials showed consistent increases in yield from F.Y.M., and superphosphate, and depression in yield from sulphate of ammonia and muriate of potash.

A comparison of mulches showed that grass and groundnut shell mulches gave significant increases in yield over no mulch or chopped guineacorn stalk mulch.

Results from a trial at Samaru for two seasons show that fungicidal spraying can control *Cercospora* leaf spot of groundnuts. This considerably increased the yield of the introduced varieties in the trial but had little effect on the locally bred varieties which appear to be tolerant of the disease.

It has been observed, particularly at Daura but also elsewhere, that high yielding varieties introduced to a new area sometimes begin by outyielding the local varieties, but then fall off badly due to poor germination. Fresh introductions repeat the original superiority. Investigations into the cause or causes of this seed deterioration are continuing.

The problem of blind nuts, i.e., shells with shrivelled or no kernels inside, which occurs regularly in several areas, continues to receive attention. Results to date suggest that application of minor elements, particularly calcium, may remedy this condition provided that the major nutrients are in adequate supply.

Seed dressing trials have shown that Fernasan D, which is successful with millet and guineacorn, is by no means the best for groundnuts. The breakdown products of gammexane appear to be toxic to the young plants. Investigations continue to find a dressing which will be applicable to a wide range of crops.

Planting sequence trials have shown that in the Middle Belt early plantings, which escape rosette disease, are essential to high yield.

COTTON

The results from the cotton breeding work this season were most satisfactory. Wide differences occurred between progenies in the replicated tests and a considerable number of selections combined high yield with good ginning percentage and adequate lint length. The best yielding progenies were far in advance of the "second wave" 26 J stock used as the standard and there is strong reason to expect that some amongst them will repeat this performance in larger scale trials and become established as confirmed higher yielding substrains of a least equal quality.

The isolation of progenies differing so clearly amongst themselves and showing such a marked advance on the parent type suggests that the methods of selection used are efficient and that the parent material still contains ample variability to be exploited.

Selections from previous seasons, undergoing large scale tests at Samaru, also did well and several proved worthy of entry into the series of district variety tests for more widespread trial.

The results of the series of district variety tests sited at eleven stations throughout the Region and containing selection of longer standing, were this season highly satisfactory. The control type was "second wave" 26 J. Every one of the seven newer strains exceeded this control in yield on average over the series. Two of them gave an increase of over 23 per cent but of these one was not of acceptable lint length. The blend of substrains already chosen to go forward to the seed multiplication scheme as third wave 26 J gave a 6 per cent higher yield of ginned lint than second wave stock.

The numerous small seed multiplication plots, which must be grown each season at Samaru to maintain seed stocks of strains under trial, all gave

good yields. Many of these plots were used to try out combinations of agronomic treatments aimed at retaining the rain on the plot and assisting its penetration.

The results of these trials were in general of too tentative a character for report here, but the yield obtained in one must be brought to notice. This trial comprised a half-acre plot of 26 J early planted, on land prepared well in advance, clean weeded and heavily dressed with F.Y.M. The furrows were cross-tied and the surface of the soil protected by a grass mulch. The crop was given phosphatic and nitrogenous fertiliser at planting and a second dose of nitrogen during flowering. The plants were protected from insect attack by frequent application of insecticides. The result was a yield of over 1,900 lbs of seed-cotton per acre—more than eight times as great as the generally accepted “average” yield of the Northern Nigerian cotton crop.

It is not possible to assess the relative importance of the various favourable treatments but it can be taken that the early planting of a high yielding strain on land in a state of high fertility generated a high yield potential and that the subsequent measures to conserve moisture and protect against insects enabled this yield to be realised.

The season was one of far more than average severity of bacterial blight incidence and this enabled some clear-cut results to be obtained in the studies of this disease. A field trial at Shika gave a most substantial and statistically highly significant difference in yield between cotton grown from undressed seed and seed dressed with Agrosan 5W. The yields were:

Undressed seed	...	...	...	...	342 lbs seed cotton per acre.
Dressed seed	...	...	...	...	431 lbs seed cotton per acre.
Increase	...	...	...	...	89 ± 12.4 lbs (viz. $26\% \pm 3.6\%$)

Other experiments showed that mercuric seed dressing was effective under a wide range of conditions and times of planting and that the main source of infection of the crop was undoubtedly seedlings grown from undisinfected seed. Cotton plant debris surviving in the open field from the previous season and exposed to rainfall before the new crop was planted was shown to be relatively quite unimportant.

Of the three fertiliser trials carried out, only that at Shika gave reliable results, superphosphate producing increases in yield while sulphate of ammonia reduced yield.

The permanent D.N.P.K. trials showed increases in yield from F.Y.M. and superphosphate; sulphate of ammonia produced increases in some years only; muriate of potash produced no effect.

A mulching trial at Samaru showed increases in yield with groundnut shell mulch only compared to grass, chopped guineacorn stalks and no mulch.

Insecticide trials on cotton at Mokwa were continued to extend the results obtained there last season. The results obtained indicate that six weekly application of a spray mixture containing D.D.T. (at 1 lb. per acre)

and *gamma* B.H.C. (at 0.3 lb. per acre) during late September and early October would give adequate control of the primary invasion of cotton stainers, and would reduce bollworm damage. Highest yields, at a little under 1,000 lbs seed cotton per acre, were less than those of last year; nevertheless it is clear that further field scale experiments on the economic possibilities of insecticide control at Mokwa are desirable.

Encouraging results were also obtained at Shendam using a D.D.T./B.H.C. spray to control cotton stainers. Smaller increases in yield were recorded at Gombe and Kontagora, where insecticidal dust was used on cotton. At other stations in the Riverain area results of insecticide trials were disappointing.

SOYA BEANS

Eight variety trials were carried out, chiefly in the Middle Belt. In spite of numerous introductions from most of the tropical world the variety Malayan, brought here in 1937, is still the most reliable. Yellow Bermelly may replace it around Kontagora. Our heavy-yielding black-seeded varieties have been discarded on advice from the United Kingdom that they are unpopular on the home market. Preliminary tests of a report that a mixture of varieties yields more heavily than a pure variety, indicate that this does not apply to the Northern Region of Nigeria.

Spacing trials show that the plant population usual here in the past has been too low and that spacing as close as two inches, or continuous drilling, on three foot ridges is profitable.

Trials of inoculation with root nodule bacteria have not shown any beneficial response but doubt exists as to the viability of the inoculum.

Five fertiliser trials were carried out in the Middle Belt provinces; three of the trials showed increases from superphosphate only, one with both superphosphate and sulphate of ammonia and one with sulphate of ammonia only.

Three years of trials at Abuja showed significant responses to both superphosphate and sulphate of ammonia but the main response was to superphosphate. Application of $\frac{1}{2}$ cwt. of superphosphate per acre could be expected to give economic returns in the area at present prices.

BENNISEED

Yandev 55 has been shown to be a high-yielding variety of even maturity and is being multiplied for distribution. A hybridisation programme with multilocular varieties in search of higher yields continues.

The permanent D.N.P.K. trial at Yandev shows small significant responses to sulphate of ammonia and superphosphate in alternate years. F.Y.M. and muriate of potash produced no effects on yield.

A comparison of broadcasting and sowing spaced on the ridge at Osara favoured broadcasting.

GRAIN STORAGE

Further samples of guineacorn were taken from the Argentine tank during August, 1957. There was a slight fall in germination count and a small rise in water content of the grain since the previous sample taken in 1956. One leak in the rubberised roof was discovered, and about 400 lbs of damaged grain were removed from the tank. Otherwise, there appears to have been little change in the condition of the main body of grain during the past year.

Guineacorn stored in rumbus, both on the head and after threshing, and treated with an insecticidal powder containing 0.5 per cent *gamma* B.H.C., showed a marked reduction in insect damage compared with untreated grain stored under similar conditions.

The dust was applied at the rate of 1 oz and 5 ozs per square yard of cross-sectional area of the rumbu, and the *gamma* B.H.C. content of the grain was determined at the time of treatment and after nine month's storage. Even at the higher dosage rate, the concentration of *gamma* B.H.C. had fallen to 1.4 p.p.m., the maximum permissible concentration on grain prepared for food being 2.5 p.p.m.

PASTURE WORK

Fifteen trials were conducted at Shika and Katsina on the establishment and management of natural and sown pastures. The vegetation at Shika is fairly typical of the Northern Guinea savanna with perennial grasses in the majority, while Katsina represents the more arid Sudan Zone with annual grasses predominating.

One study at Shika has shown that the usual practice of early mid-dry season burning is harmful to the pasture and fails to control regeneration of woody plants. A burn at the beginning of the rains, on the contrary, does least damage to the grass and is largely successful in controlling bush.

Of the large collection of introduced grasses and legumes only a few have been found suitable for introduction into pasture trials. Among the indigenous grasses one perennial, *Andropogon gayanus*, and two annuals *Pennisetum pedicellatum* and *P. subangustum*, have shown promise under a wide range of conditions. *Chloris gayana* is the most promising of the introduced grasses but needs careful management if it is to persist after the second year. A number of strains has been selected within these grasses. The most successful legume to date is *Stylosanthes gracilis*, introduced from South America.

In the Guinea savanna the main response to fertilisers is to sulphate of ammonia. In the Sudan Zone there are responses both to sulphate of ammonia and superphosphate.

ANIMAL NUTRITION

A small flock of thirty sheep has been collected at Shika. These are being used to measure the relative nutritive value of the improved forage crops grown there.

Three groups of dairy cows fed concentrates, according to live weight and production, at 25 per cent above British standards, British standards and 25 per cent below. The 25 per cent increase in feeding level produced 5 per cent more milk and the 25 per cent reduction produced 10 per cent less. The extra feeding increased live weight rather than milk yield.

During the wet season from mid June to mid November, four groups of heifers were fed extra protein at three different rates. The fourth group was the control. Live weight increases showed that even during the rains the amount of protein available from bush grazing is insufficient. The groups receiving extra protein showed increased live weight gains over the control group of 50, 63 and 79 lbs., increasing with the amount of extra protein fed.

Grass ensiled with the addition of sodium metabisulphite produced a good quality silage with very little spoilage, but the palatability was less than that of the control. Added carbohydrate in the form of guineacorn flour failed to stimulate fermentation and produced an unpalatable product with a large amount of spoilage.

FALLOWS

A comparison of lengths of natural fallow at Daura showed that a six year fallow was superior to two and four year fallow in the first year of the cropping cycle only. Four other length-of-fallow trials are continuing.

CROPPING SYSTEMS

The comparison of 3 ft. ridges, 4 ft. ridges and hills at Bida showed that 3 ft. ridges had no particular advantage over the local practices of 4 ft. ridges or hills except in the case of groundnuts. Five other trials on various cropping systems continued.

WEED CONTROL

Trials of various herbicides for control of *Cynodon dactylon* continued. Dalapon gave promising results.

APICULTURE

The North European Black Bee has been found, under Nigerian conditions, to concentrate too much on honey production at the expense of the brood. In consequence the colonies become weak and die out. The Italian bee, on the contrary, is here as fanatical a brood producer as the local bee and so is little improvement on it. Search for an intermediate type continues.

SOIL NITRATE STUDIES

Weekly soil samples from an area under natural cover and one kept clear of all vegetation were examined for nitrate. Under natural cover the level remained low and did not fluctuate. This has been variously attributed to removal by the growing plant of the nitrate produced, inhibition of nitrification by plant root exudates and to denitrification. In the bare-soil area it was found that during the dry season there was a build-up of nitrate

up to three times the level found during the rains. This is probably due to the occurrence of optimum conditions of moisture and temperature immediately after the end of the rains and later transfer of nitrate from the subsoil by capillarity. The presence of areas of very high and very low nitrate content within the plot at the end of the dry season supports the capillarity theory. In the bare soil area during the first half of the rains, the nitrate content fluctuated, rising with rainfall and falling during dry spells. This correlation disappeared during the latter half of the wet season.

SOIL SURVEY

During the year the large scale survey of the Region was impeded by the necessity for detailed *ad hoc* surveys. These were of the farm centres at Maiduguri, Daudawa and Shika, the Katsina Livestock Improvement Centre and the Afaka Forest Reserve. A survey of fifty square miles at Bacita, 9 miles south of Mokwa, was undertaken to estimate the area suitable for the cultivation of sugar cane under irrigation. This was found to be only 4,000 acres. At Jema'a a reconnaissance survey covered twenty-two square miles to determine the areas suitable for tree crop production.

The Katsina detailed survey was followed by a rapid reconnaissance survey of soils and vegetation along the roads leading from the town. Some 1,200 square miles were covered. In addition a rapid overall ecological survey of the Region was carried out along approximately 5,000 miles of road and notes on soils and vegetation collected. As a result, and from information derived from the twelve detailed experimental farm surveys, reasonably accurate knowledge is available of the broad distribution of the main soil types of the Region.

A start was also made on the large scale survey of the Region. Sheet No. 152, Gombe, an area of 1,200 square miles, was completed. This is part of the 12,000 square miles area between the Benue river, Potiskum and Damaturu. This sheet was chosen in view of the proposed railway extension to Maiduguri.

The second survey completed was of the 1,200 square mile area of Sheet 51 in the Zamfara valley in south Sokoto Province. This lightly populated area is being opened up by roads and bridges and a soil and vegetation survey was considered necessary to assist in planned development.

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